

THE CONTINENTAL SHELF: RESOURCES (EXCLUDING OIL
AND GAS) AND LEGAL STATUS

TWO VOLUMES

Seyed Hossein Sadat Marashi

Degree of Ph.D.
University of Edinburgh
1982



To my mother, brother, sister and Liz

I, Seyed Hossein Sadat Marashi, hereby declare that
the thesis which follows is wholly my own work.



THE UNIVERSITY *of* EDINBURGH

PAGE ORDER INACCURATE IN ORIGINAL

ACKNOWLEDGMENTS

The writing of this thesis would not have been possible without the help of the following people to whom I shall always be indebted:

Dr. Patricia Birnie for her constant encouragement and supervision. Her knowledge on various aspects of the Law of the Sea, which she generously shared with me through the numerous discussions we had, helped me not only in the writing of this thesis but for widening my understanding of the legal and political complexities regarding the Law of the Sea.

Mr. W. Gilmore who, in the absence of Dr. Birnie while she was on sabbatical, undertook the task of supervising me. It was a privilege to benefit from his guidance as well as his over-all analysis of my thesis.

Professor I.C. MacGibbon who, on several occasions, gave me a lot of advice on matters relating to international law.

Mr. R. K. Khan for reading and making valuable comments on certain parts of this work.

Ms. G. Mlcoh who, despite being extremely busy with her own research, helped me to type the first draft of this thesis.

Finally, Elizabeth Potter for her total involvement with my work. Her contributions to my thesis can never be adequately acknowledged.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS.....	(i)
TABLE OF CASES.....	(xi)
LIST OF ABBREVIATIONS.....	(xiii)
INTRODUCTION.....	(xv)

VOLUME I

PART ONE

DEVELOPMENT OF THE CONTINENTAL SHELF DOCTRINE AND THE 1958 GENEVA CONFERENCE ON THE LAW OF THE SEA.....	1
CHAPTER I: DEFINITION OF THE CONTINENTAL SHELF..	1
Introduction.....	1
A. Geological Definition of the Shelf.....	3
B. Biological Aspects of the Resources of the Continental Shelf.....	8
C. Definition Adopted by the 1958 Geneva Convention on the Continental Shelf.....	11
i. Definition of the Shelf.....	11
ii. Definition of Natural Resources.....	16
Conclusion.....	19
CHAPTER II: CUSTOMARY INTERNATIONAL LAW AND THE RIGHT OF STATES TO SUBMARINE AREAS	20
Introduction.....	20
A. Acquisition of Territory.....	22
i. Occupation.....	23
ii. Acquisitive Prescription.....	28
iii. Historic Rights.....	39
B. State Practice Before 1945.....	45
i. Exploitation of the Resources of the Seabed.....	45
1. Pearl and Chank Fisheries.....	45
2. Other Sedentary Fisheries.....	53
ii. Exploitation of the Resources of the Subsoil.....	58
Conclusion.....	61

CHAPTER III: THE CONTINENTAL SHELF DOCTRINE.....	63
Introduction.....	63
A. Emergence of the Continental Shelf Doctrine Before 1945.....	65
i. Portugal.....	65
ii. Spain.....	67
iii. Russia.....	68
iv. Treaty of the Gulf of Paria.....	70
B. The United States Proclamation of 1945....	72
i. Background to the Proclamation.....	72
ii. The Scope of the Proclamation in Terms of the Resources.....	78
iii. The Scope of the Proclamation in Terms of the Submarine Areas and the Rights Claimed.....	82
C. Claims Made by States Between 1945 and 1958	86
i. Claims to Submarine Areas With a Precise Depth Limit or to the Continental Shelf in its Geological Sense.....	90
1. Mexico.....	90
2. Pakistan.....	92
3. Nicaragua.....	92
4. Ecuador.....	94
5. Guatemala.....	96
6. Iceland.....	98
7. Cambodia.....	99
ii. Claims to Submarine Areas With a Precise Width Limit.....	101
1. Chile.....	102
2. Other Latin American Claims.....	105
3. The Maritime Zone Declaration of 1952.....	107
iii. Claims to Submarine Areas Without any Definite Limit.....	112
Conclusion.....	117
CHAPTER IV: UNITED NATIONS AND THE FIRST CONFERENCE ON THE LAW OF THE SEA.....	119
Introduction.....	119

A. The ILC's Draft Articles on the Continental Shelf.....	122
i. The ILC Definition of the Continental Shelf: 1951.....	122
ii. The ILC Definition of the Continental Shelf: 1953.....	131
iii. The ILC Definition of the Continental Shelf: 1956.....	136
B. The ILC's Definition of Natural Resources	140
i. The ILC Definition of Natural Resources: 1950 and 1951.....	140
Sedentary Fisheries.....	144
ii. The ILC Definition of Natural Resources: 1953.....	148
Historic Rights.....	157
iii. The ILC Definition of Natural Resources: 1956.....	161
1. Rome Conference: 1955.....	161
2. Inter-American Council of Jurists: 1956.....	162
3. Inter-American Specialized Conference: 1956.....	163
4. The ILC Definition of Natural Resources: 1956.....	164
C. The First United Nations Conference on the Law of the Sea.....	175
i. General Debate.....	177
ii. The Fourth Committee's Debate on Article 67.....	180
1. Depth Limit.....	180
2. Depth and Distance Limit.....	181
3. Depth and Shelf Edge.....	182
4. Geological Limit.....	183
iii. The Fourth Committee's Debate on Article 68.....	185
Conclusion.....	190
PART TWO	
NATURAL RESOURCES OF THE CONTINENTAL SHELF	195
CHAPTER V: LIVING RESOURCES OF THE CONTINENTAL SHELF.....	196
Introduction.....	196

A. Primary Production in the Coastal Zone....	198
i. Definition of Natural Resources.....	198
1. Plankton.....	198
2. Nekton.....	199
3. Benthos.....	200
ii. Ecology of the Coastal Zone.....	200
iii. Primary Production in the Coastal Zone.	204
iv. Primary Producers and Nutrient Salts...	207
1. Phytoplankton.....	207
2. Benthic Plants (macro algae).....	209
a. Economic Importance of Benthic Plants.....	211
b. Relationship Between Benthic Plants and Animals.....	214
v. Legal Status of Primary Producers in the Coastal Zone.....	216
B. Benthic Animals of the Coastal Zone.....	221
i. Definition of Benthic Organisms of the Coastal Zone.....	223
ii. Distribution of Benthic Organisms of the Coastal Zone.....	226
C. Molluscs.....	230
i. Gastropoda.....	232
1. Locomotion.....	232
2. Nutrition and Habitat.....	233
3. Economic Importance of Gastropods...	233
4. Legal Status of Gastropods.....	235
ii. Bivalvia.....	237
1. Locomotion.....	237
2. Nutrition and Habitat.....	238
3. Economic Importance of Bivalvia.....	239
4. Legal Status of Bivalvia.....	240
D. Crustacea.....	246
i. Natantia.....	248
1. Locomotion.....	248
2. Nutrition and Habitat.....	248
3. Economic Importance of Natantia.....	250
4. Legal Status of Natantia.....	252

ii. Reptantia.....	257
1. Locomotion.....	257
2. Nutrition and Habitat.....	259
3. Economic Importance of Reptantia..	260
4. Legal Status of Reptantia.....	262
Conclusion.....	264
CHAPTER VI: NON-LIVING RESOURCES OF THE CONTINENT- AL SHELF.....	
Introduction.....	271
A. Seawater as a Resources.....	274
i. Desalination.....	278
a. Economic Problems.....	279
b. Environmental Problems.....	282
ii. The Use of Seawater for Cooling.....	285
a. Direct Biological Problems.....	285
b. Indirect Biological Problems.....	287
iii. Extraction of Minerals from Seawater.	291
iv. Legal Status of Seawater.....	297
B. Non-living Resources of the Seabed of the Continental Shelf.....	308
i. Materials for Construction.....	311
ii. Materials for Fertilizers and Animal Feed.....	315
1. Phosphorite.....	315
2. Shells.....	317
3. Glauconite.....	318
iii. Minerals (metallic) from the Seabed of the Continental Shelf.....	319
iv. Precious Minerals.....	323
v. Biological Effects of Dredging Opera- tions on the Marine Environment.....	325
C. Non-living Resources of the Subsoil of the Continental Shelf.....	330
i. Non-metallic Resources of the Subsoil	332
1. Sulphur.....	332
2. Barytes (Barite).....	333
3. Coal.....	334
4. Fresh Water.....	335

ii. Metallic Minerals from the Subsoil....	336
iii. Biological Effects of the Exploitation of Minerals from the Subsoil.....	338
iv. Legal Basis of Exploitation of Seabed and Subsoil of the Continental Shelf..	341
1. Provisions of 1958 Geneva Convention on the Continental Shelf.....	343
2. Provisions of the UNCLOS III Texts.	345
3. The United Nations Environmental Programme.....	349
a. Stockholm Declaration.....	349
b. UNEP's Draft Principles on Shared Natural Resources.....	350
4. Provisions of the Draft Convention on the Law of the Sea Regarding Marine Environment.....	353
VOLUME II PART THREE	
DISPUTES RELATING TO THE EXPLOITATION OF THE LIVING RESOURCES OF THE CONTINENTAL SHELF.....	356
CHAPTER VII: LEGAL STATUS OF UNILATERAL DECLARA- TIONS IN INTERNATIONAL LAW.....	358
Introduction.....	358
A. Definition of Unilateral Declaration.....	360
B. Unilateral Declarations Contrary to the Existing International Law.....	364
C. Disputes Concerning Unilateral Declara- tions Asserting Rights over the Continent- al Shelf and its Resources.....	371
i. Unilateral Declarations Asserting Rights over the Continental Shelf and its Mineral Resources.....	371
ii. Unilateral Declarations Asserting Rights over the Continental Shelf and Including both its Living and Non-living Resources	373
Conclusion.....	376
CHAPTER VIII: THE DISPUTES.....	377
Introduction.....	377
A. Disputes Concerning Unilateral Declara- tions.....	378
i. Disputes Between the United States and Some Latin American Countries.....	378
ii. The Onassis Incident.....	381

iii. Dispute Between Japan and Australia...	386
1. Background to the Pearl Fisheries Act 1952.....	388
2. Japanese Engagement in Pearl Fisheries off the Australian Coasts....	390
3. Pearl Fisheries Act 1952-1953 and the View of the ILC on Sedentary Species.....	392
iv. Dispute Between Japan and the Republic of Korea.....	397
1. The Republic of Korea Presidential Proclamation of 1952.....	400
2. Japan Protest of 1952 and Korean Reply.....	403
3. Japanese-Korean Negotiations: 1952-1964.....	406
4. Agreement Between Japan and Republic of Korea: 1965.....	410
B. Disputes Concerning the Definition of Natural Resources in the 1958 Geneva Convention on the Continental Shelf.....	414
i. Legal Definition of Sedentary Species Before 1958.....	417
ii. Legal Definition of Sedentary Species in Article 2(4).....	422
iii. The Disputes.....	425
1. The 1962 Dispute Between France and Brazil.....	425
2. Dispute Between Japan and the United States.....	433
3. The United States Regulations Regarding Lobster.....	441
Conclusion.....	450
PART FOUR	
CURRENT DEVELOPMENTS IN THE LEGAL REGIME FOR EXPLOITATION OF THE NATURAL RESOURCES OF THE CONTINENTAL SHELF.....	452
CHAPTER IX: DEVELOPMENT OF THE LAW OF THE SEA BETWEEN 1958 AND 1973.....	
A. General Move Towards 12 Miles Territorial Sea.....	454
B. The Seabed Committee.....	464

C. The 1969 Continental Shelf Cases.....	472
D. Other Developments in the Law of the Sea...	482
i. Latin American States.....	482
1. Montevideo Declaration: 1970.....	483
2. Lima Declaration: 1970.....	485
3. Santo Domingo Declaration: 1972.....	487
ii. Organization of African Unity (OAU) and the Law of the Sea.....	491
iii. The Group of 77.....	495
E. Preparatory Work of the Seabed Committee...	497
i. The Work of the Committee in 1971.....	498
ii. The Work of the Committee in 1972.....	502
iii. The Work of the Committee in 1973.....	505
a. Proposals Relating to the Terri- torial Sea and the EEZ.....	506
b. Proposals Relating to the Continental Shelf.....	508
CHAPTER X: THE THIRD UNITED NATIONS CONFERENCE ON THE LAW OF THE SEA.....	514
Introduction.....	514
A. The Conference.....	515
1. UNCLOS III, First Session: 1973.....	516
2. UNCLOS III, Second Session: 1974.....	518
i. The Territorial Sea.....	519
ii. The Continental Shelf.....	520
iii. The Economic Zone.....	524
3. UNCLOS III, Third Session: 1975.....	537
i. The Territorial Sea.....	540
ii. The Economic Zone.....	541
iii. The Continental Shelf.....	545
4. UNCLOS III, Fourth Session: 1976.....	547
5. UNCLOS III, Fifth Session: 1976.....	550
6. UNCLOS III, Sixth Session: 1977.....	554
i. The Territorial Sea.....	556
ii. The Exclusive Economic Zone.....	557
iii. The Continental Shelf.....	559
7. UNCLOS III, Seventh Session: 1978.....	561
i. Negotiating Group 4.....	562
ii. Negotiating Group 5.....	564
iii. Negotiating Group 6.....	570

8. UNCLOS III, Eighth Session: 1979.....	573
i. Rights of Access to the Living Resources of the EEZ by the LLGDS.....	574
ii. The Question of Settlement of the Disputes Relating to the Exercise of Sovereign Rights in the EEZ.....	576
iii. Outer Limit of the Continental Shelf and the Question of Payments.....	578
9. UNCLOS III, Ninth Session: 1980.....	581
i. Submarine Ridges.....	581
ii. The Problem of Sri Lanka.....	582
iii. Commission on the Limits of the Continental Shelf.....	583
iv. Delimitation Between Opposite and Adjacent States.....	584
10. UNCLOS III, Tenth Session: 1981.....	589
B. State Practice Since 1973.....	590
i. The Territorial Sea.....	590
ii. The Exclusive Economic Zone.....	592
iii. The Continental Shelf.....	599
Conclusion.....	601
General Conclusion.....	603
Select Bibliography.....	611

TABLE OF CASES

- Aegean Sea Continental Shelf Case:
I.C.J. Reports, 1978, p. 3.
- Anglo -French Continental Shelf Case (1977):
54 I.L.R. 1979, p. 6.
- Anglo -Norwegian Fisheries Case:
I.C.J. Reports, 1951, Vols. 1-4.
- Attorney General of British Columbia v. Attorney General
of Canada:
(1921) 1. A.C. 413.
- Duchess of Sunderland v. Watson:
(1868) 6 M. 99.
- Fisheries Jurisdiction Cases:
I.C.J. Reports, 1974, p. 1.
- Feynoord (The):
(1858) S.W. 374.
- General Iron Screw Collier Company v. Schurmanns:
(1860) 1 J. & H. 180.
- Island of Palmas Case (1928):
UNRIAA, Vol. II, p. 829.
- Legal Status of Eastern Greenland:
P.C.I.J. Reports, Series A/B. No. 53
(1933), p. 22.
- Lotus Case:
P.C.I.J. Reports, Series A. N. 10
(1927), p. 4.
- Mortensen v. Peters:
(1906) 8 Fraser.
- New South Wales & Others v. Commonwealth of Australia:
(1975) 135. C.L.R. 337.
- North Sea Continental Shelf Cases:
I.C.J. Reports, 1969, p. 3.
- Nuclear Tests Cases:
I.C.J. Reports, 1974, p. 253.
- R. v. Keyn:
(1876) 2 Exch. Div. p. 63.

Reference re Offshore Mineral Rights of British Columbia:
(1967) S.C.R. 792.

Saxonia, The:
(1862) 31 L.J.Ad. 201.

Scotia, The:
14 Wallace (1872), p. 170.

Trail Smelter Case, The, 1938 and 1941:
3 UNRIAA, Vol. III, p. 1905.

U.S. v. Antonietta Madre:
Civil No. 75-713, S.D.N.Y. 1975.

U.S. v. Bulgaria F/V Argonaut:
Civil No. 75-2345, D.Mass. 1975.

U.S. v. Daishin Maru:
Civil No. 75-350-N, E.D.Va. 1975.

U.S. v. California:
332 US 19 (1947).

U.S. v. Louisiana:
339 US 699 (1950).

U.S. v. Main & Others:
420 US 515 (1975).

U.S. v. Stern Trawler Tontini Pesca Quarto:
Civil No. 75-516, S.D.N.Y. 1975.

U.S. v. Texas:
339 US 707 (1950).

William Hutt, The:
(1860) Lush. 25.

ABBREVIATIONS

<u>Abbreviation</u>	<u>Full Name</u>
AJIL	American Journal of International Law
BYIL	British Yearbook of International Law
CEP	Chile, Ecuador and Peru
CLP	Current Legal Problems
COFI	Committee on Fisheries (FAO)
EEZ	Exclusive Economic Zone
FAO	Food and Agricultural Organization
FAOYFS	FAO's Yearbook of Fisheries Statistics
GA	General Assembly
GAOR	General Assembly's Official Records
HMSO	Her Majesty's Stationery Office
IAEA	International Atomic Energy Agency
ICJ	International Court of Justice
ICLQ	International and Comparative Law Quarterly
ICNT	Informal Composite Negotiating Text
IJIL	Indian Journal of International Law
ILA	International Law Association
ILC	International Law Commission
ILM	International Legal Materials
ILR	International Law Reports
ISNT	Informal Single Negotiating Text
NG	Negotiating Group

(xiv)

OAU	Organization of African Unity
ODIL	Ocean Development and International Law
PCIJ	Permanent Court of International Justice
PPM	Parts Per Million
PSQ	Political Science Quarterly
RIAA	Reports of International Arbitral Awards
RSNT	Revised Single Negotiating Text
SDNY	Southern District of New York
SR	Sierra Club
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNIC	United Nations Information Center
UNCLOS	United Nations Conference on the Law of the Sea
UNLS	United Nations Legislative Series
UNTS	United Nations Treaty Series
UNEP	United Nations Environmental Programme
WMO	World Metrological Organizations
WP	Working Paper

INTRODUCTION

The continental shelf, as a concept, presents three dimensions. First, it has a geological dimension concerning its definition, its limit and its resources. It is referred to by geologists as the continuation of the land mass under the sea water the topography and resources of which, very often, resemble the topography and the resources of its adjacent land. The seaward limit of the continental shelf depends entirely on its geographical location. Secondly, it has a biological dimension concerning the water covering the shelf and the resources therein as well as the living resources inhabiting its seabed. The water is referred to by marine biologists as the neritic zone. This zone is the most productive area of the oceans in terms of biological productivity. Thirdly, it has a legal dimension concerning the rights of the coastal and other States in respect of its resources.

The continental shelf, as a legal concept, was introduced by the United States in 1945. This was the result of rapid technological advances in offshore engineering the progress of which had facilitated the exploitation of petroleum beyond the generally accepted three mile limit of the territorial sea. Between 1945 and 1958, the continental shelf doctrine, as a legal concept, developed through unilateral declarations some of which were contrary to the existing rules of customary international law. The continental shelf was defined (or was not defined as the

case may be) and claimed in terms reflecting the interests of the declarant States. There was no uniformity in those claims regarding its definition, its resources, its limit or the coastal States' jurisdictional rights.

In 1958 the First United Nations Conference on the Law of the Sea was held in Geneva. The provisions of the 1958 Geneva Convention on the Continental Shelf, which were based on the draft articles concluded by the International Law Commission between 1951 and 1956, did not succeed in solving any of the problems which had emerged as the result of the unilateral declarations. Part One of this work deals with the development of the continental shelf doctrine and the 1958 Geneva Convention on this subject and identifies some problems arising from the latter.

The geological and biological dimensions of the concept of the continental shelf have been dealt with in detail in Part Two of this work. Living resources of the continental shelf were referred to in the 1958 Geneva Convention as "sedentary species" which were defined as "organisms which, at the harvestable stage, either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or subsoil". This is an oversimplification of the biological and other characteristics of resources found on or near the shelf, many of which are extremely valuable and important to fishing industries of States other than the coastal State. This definition had neither a legal

background to justify its inclusion in the Convention nor a biological basis.

The non-living resources of the seabed and subsoil of the continental shelf with the exceptions of oil and gas and the special problems relating to their exploitation and conservation have been defined and described. In addition seawater has also been regarded as one of the resources of the continental shelf for a variety of reasons which have been explained in Chapter VI. By defining the resources and describing the complexities involved in maintaining a sound environmental balance it is hoped to show the continental shelf as one entity though with three dimensions. The exploitation of the natural resources of the continental shelf requires a regime which takes account of its biological characteristics as well as its geological realities.

The claims made by some coastal States over what they regarded as the continental shelf and their exercise over its natural resources were opposed by some States and led to some disputes. Further disputes developed as the result of various interpretations of the definition of sedentary species as adopted in the 1958 Geneva Convention on the Continental Shelf. Disputes concerning the validity of some of the unilateral declarations and those concerning the interpretations of the definition of the natural resources have been described in Part Three.

In 1970, the General Assembly decided to convene a new Conference on the Law of the Sea whose First Session was held in New York in 1973. The decision followed a

series of developments regarding the Law of the Sea between 1958 and 1970. The Conference has held Ten Sessions so far and it is likely that the Draft Treaty which was provided by the Conference in 1980, as amended in 1981, will be negotiated for the last time in 1982 and will then be adopted as a Convention and open for signatures. The development of the Law of the Sea before 1973 and the legal status of the continental shelf and its resources according to the provisions of the documents provided by the UNCLOS III have been described in Part Four. It will be concluded that with or without a Treaty (a Treaty in its present form) the legal status of the continental shelf and its resources (excluding oil and gas) remains far from satisfactory.

PART ONE

DEVELOPMENT OF THE CONTINENTAL SHELF DOCTRINE AND
THE 1958 GENEVA CONFERENCE ON THE LAW OF THE SEA

CHAPTER I

DEFINITION OF THE CONTINENTAL SHELF

Introduction

Since 1945 the natural resources of the continental shelf have become the subject of both unilateral claims and conventional agreements. The right of the coastal States over the continental shelf is no longer a disputed issue in international law but three outstanding questions, which are closely related to the legal regime for exploitation of the natural resources of the continental shelf, have yet to be settled. These are first, the definition of the continental shelf, second, the definition of the natural resources of the continental shelf and finally, the extent and the nature of the coastal States' rights, as recognized by international law, over the continental shelf and its resources.

Although the term 'continental shelf' has a geological origin the legal definition of the continental shelf, which was adopted in 1958 at the First United Nations Conference on the Law of the Sea, developed independently of its geological concept. Thus it is important to distinguish between the definition of the continental shelf in its geological concept and the definition based on its legal development.

The biological aspects relating to the natural resources of the continental shelf and their exploitation are also important to the development of the continental shelf regime since they are the basis of some controversies regarding the conservation of resources, the allocation of certain resources and questions relating to the preservation of the marine environment.

In this chapter the geological and the legal definitions of the continental shelf, together with the biological aspects relating to the natural resources of the continental shelf, will be examined.

A- Geological Definition of the Continental Shelf

The term 'continental shelf' was introduced by Hugh Robert Mill, a British geographer, in 1892. In his book The Realm of Nature he referred to the continental shelf in the following terms:

"In nearly all cases at the top of the activity, usually at the point where the depth of water is about 100 fathoms, the slope suddenly becomes much more gentle, and continues very gradual up to the coastline. This gentle slope has been termed the Shelf Flat, or the Continental Shelf".¹

Geologically, the continuation of the land mass from the shore outward, until it slopes off abruptly into a greater depth, is called the continental shelf.²

-
1. Hugh Robert Mill, The Realm of Nature, An Outline of Physiography, 1892, pp. 196-201, sects. 263, 264 & 267.
 2. According to Skinner and Turekian, "The continental shelf is a submerged extension of the adjacent continent with similar topography and underlying rocks", Brian J. Skinner and Karl K. Turekian, Man and the Ocean, 1973, p. 8. According to Turekian "The continental shelf is the submerged continuation of the topography and geology visible on the adjacent land, modified in part by marine erosion or sediment deposition. The shelf break, wherever it can be seen unambiguously, marks the seaward extent of the continental shelf and occurs at depths of between 10 to 550 meters, averaging 200 meters", Karl K Turekian, Oceans, 2nd ed, 1976, pp. 16-17. According to Stowe "Going seaward from shore, the first submerged region is called the continental shelf. It is really an extension of the continent that just happens to be submerged at this particular point in the earth's history. It hasn't always been submerged, and undoubtedly will be above water from time to time in the future in response to minor changes in sea level", Keith S. Stowe, Ocean Science, 1979, p. 77. In Glossary of Geology and Related Sciences with Supplement (2nd ed) published by the American Geological Institute, the term Continental Shelf has been defined as "A shallow, gradually sloping zone extending from the sea margin to a depth at which there is a marked or rather steep descent into the depths of the ocean down the continental

In 1952, the International Committee on the Nomenclature of Ocean Bottom Fisheries defined the continental shelf as:

"...the zone around the continent, extending from the low water line to the depth at which there is a marked increase of slope to greater depth".³

Although the average estimated width of the continental shelf is about 30 miles, this figure can vary from zero to almost 800 miles and so a precise figure cannot be given.⁴ Moreover, although there is a general agreement among scientists as to the average depth of 200 metres, or more precisely 133 metres, it actually varies from 20 to 550 metres.⁵

slope. The seaward boundary of the shelf averages about 130 meters in depth but may be more or less", see the above definition in H.W. Menard, Geology, Resources and Society, An Introduction to Earth Science, 1974, p. 585. Franklin notes that "When geologists, geographers and other scientists use the term 'continental shelf' in a broad sense they mean the submarine extension of the 'continent' outward into the sea; a kind of pedestal on which the continents seem to rest in the ocean", Carl M. Franklin, "The 1958 Geneva Convention on the Continental Shelf", in International Law Studies, US Naval War College 1959-60, 1961, p. 12.

3. International Law Commission (ILC) Yearbook, 1956, vol.I, p. 230. See also H.M. Jain, "Continental Shelf - Some Geological Aspects", vol. 12 Indian Journal of International Law (1972), pp. 564-580; J.H.V. Umbgrove, "Origin of the Continental Shelves", 30 Bulletin of American Association of Petroleum Geologists, 1946, pp. 249-253. See particularly the United Nations Preparatory Document No. 2, "Scientific Considerations Relating to the Continental Shelf", UN Doc. A/Conf. 12/2, 1957.
4. "The width of the continental shelf ranges from less than one mile up to 800 miles", The Report of the Secretary General to the UN Economic and Social Council on the Resources of the Sea, 19 February, 1968.
5. See the UN Preparatory Document No. 2, Loc. Cit., in note 3 above; K.O. Emery, "The Continental Shelves", in Ocean Science, published by Scientific American, 1977, pp. 33-45, at pp. 33-34.

The only point on which scientists have agreed is that of the definition of the continental shelf. The shelves all over the world, according to Umbgrove cover 27,000,000 square kilometres or 7.6 per cent of the surface of the oceans.⁶ This, however, is equal in extent to 18 per cent of the earth's total land area.⁷ According to the UN experts:

-
6. J.H.F. Umbgrove, The Pulse of the Earth, 2nd ed, 1947, p. 99; H.U. Sverdrup, M.W. Johnson and R.H. Fleming, The Oceans - Their Physics, Chemistry and General Biology, 1941, pp. 9-15. Descriptions of the origin of the continental shelf and its formation enable us to understand why there is no uniformity in the width, depth and physical configuration of the continental shelf. According to Umbgrove the formation of the continental shelf is essentially the result of the following processes:
- i. Erosion. This has been defined by Umbgrove as "the cutting by waves of land areas and coastal terraces during times of lowered sea level caused by glaciers of the continent"; the shelves off Southern California are examples of erosion.
 - ii. Sedimentation. Examples of this are the shelves off the east coast of the United States and northern Gulf of Mexico.
 - iii. Glacial action. The shelves formed by this process are very irregular. Examples are the continental shelves of Norway.
 - iv. Bulging and Downwarding. This is a common type in various parts of the world in particular off the African coasts.
 - v. Blockfaulting and folding. Examples of this are found along the southern coast of California.
- See Umbgrove, "Origin of the Continental Shelf", Loc. Cit. in note 3 above, pp. 249-253. See also F.P. Shepard, Submarine Geology, 1948, Chapter 5; Joe S. Creager, Coastlines and Continental Shelves: Geological History and Characteristics, in Ocean Resources and Public Policy, edited by T.S. English, 1973, pp. 11-24.
7. Franklin notes that: "...the continental shelves of the world (including insular shelves) are estimated at approximately 10,500,000 square miles, roughly 18 per cent of the 58,000,000 square miles of present dry land areas, and about 7.6 per cent of the total ocean areas of the world", Franklin, Loc. Cit. in note 2 above, p. 14. See also the UN Preparatory Document No. 2, Loc. Cit., in note 3 above, pp. 1-6.

"...the shelf is very unequally distributed around the continents. It can be of a width of several hundred kilometres, as off the Guianas, and in other cases, can be limited to 1 or 2 kilometres or even be completely lacking (western coast of Corsica....)....".⁸

According to a calculation made by Mr.L.M. Alexander in 1971, of the 112 coastal States some 22 are totally or effectively shelf-locked, and 62 States have very narrow shelves.⁹ There are only 28 States which have broad continental shelves.¹⁰

-
8. The UN Preparatory Document No. 2, Loc. Cit., in note 3 above, p. 2. It was further stated by the UN experts that: "It is important, however, to emphasize that total absence of the continental shelf is a rare feature, and that the shelf usually exists not only off flat coasts like North Siberia or South Argentina, but also off a number of mountainous coasts like that of Galicia on the north west side of Iberian Peninsular, where the shelf extends to a width of about twenty kilometres in spite of the fact that immediately inland there are found heights from 400 to 600 metres. It is, however, true that it is particularly off mountainous coasts that the shelf may be missing....". Loc. Cit. at p. 2.
 9. Lewis M. Alexander, "Alternative Regimes for the Continental Shelf", in vol. 2 *Pacem in Maribus* (1971), pp. 31-43, at pp. 31-32. States which are totally or effectively shelf-locked are: Bahrain, Belgium, Cambodia, Ethiopia, Finland, Federal Republic of Germany, German Democratic Republic, Iraq, Jordan, Kuwait, Netherlands, Poland, Qatar, Saudi Arabia, Singapore, Sudan, Sweden, Thailand, North Vietnam, United Arab Emirates, Yemen and Yugoslavia. See also Lewis M. Alexander, "The Role of the Geographically Disadvantaged States in the Law of the Sea", in vol. 13 *San Diego Law Review* (1976), pp. 558-582, at p. 565.
 10. These are: Argentina, Brazil, Canada, China, Guinea, Guyana, Honduras, Iceland, India, Indonesia, Ireland, Korea, Mauritius, Mexico, New Zealand, Nicaragua, Norway, Pakistan, Philippines, South Africa, Soviet Union, Tunisia, United Kingdom, United States, Uruguay, and South Vietnam. See Alexander, "Alternative Regimes for the Continental Shelf", Loc. Cit., in note 9.

The formation of the continental shelf which is the result of diverse factors including geological processes, the physical characteristics of the submarine crust and specific geographical locations, has had an important impact on its legal definition.¹¹

11. See Franklin, Loc. Cit., in note 2, pp. 12-19. For State practice regarding the definition of the continental shelf between 1945 and 1958 see below Chapter III (C), and for the legal definition adopted by the 1958 Geneva Convention on the Continental Shelf see below Chapter IV.

B- Biological Aspects of the Resources of the Continental Shelf

While the geological description of the continental shelf has been studied by most international jurists for the purpose of delimitation of the continental shelf with regard to the mineral resources, the biological factors which indicate the characteristics of the living organisms of the continental shelf have been largely neglected.

Biologically, the area of the submerged land and its superjacent waters from the shore to a depth of 200 metres is termed the neritic zone; beyond the neritic zone the area is called the oceanic zone. "The neritic zone", say Stroup and Smith:

"...extends from the shore out to a depth of 200 m, basically comprising the water lying over the continental shelves. It is very difficult to make any valid generalizations about this zone, except for one: its properties are so variable in space and time that generalizations are dangerous".¹²

Variability of the living organisms of the neritic zone is subject to the climatic influence of the nearby landmass, river runoff, tidal currents and the effects of the shoreline on seawater circulation patterns.

-
12. E.D. Stroup and S.V. Smith, "Physical Oceanography and Geology", in Open Sea Mariculture, edited by J.A. Hanson, 1974, pp. 61-105, at pp. 95-97. According to Sir Alistair Hardy "While a few plankton animals can tolerate considerable ranges of temperature, most species can be classed as either oceanic or neritic according to whether they are confined in their distribution to the more oceanic waters of higher salinity or to those coastal waters in which the salinity has been slightly lowered by fresh-water drainage from the land", The Open Sea, "World of Plankton", 1956, at p. 79.

Nutrient concentration, generally speaking, is much higher in the neritic zone than the oceanic zone. This is partly due to the runoff from land, but more importantly, also to the presence of a shallow bottom, which prevents the nutrient substances being wasted. In other words, the shallowness eliminates the downward loss of nutrients that is characteristic of the deep sea. According to Perkins:

"Away from the rich continental shelf and areas of upwelling of water off continental shores, eg. Humboldt, the fertility of the sea decreases. In comparison with these rich waters, the true 'blue-water' or central water masses are impoverished and are characterized by a greater number of species which occur at a low density of population".¹³

It is not surprising, therefore, that the continental shelf is considered as a natural refuge of the living resources of the sea, and that furthermore, as has been pointed out by Professor Schaefer, "of the total biomass of benthic animals in the ocean, about 83 per cent is estimated to exist in depths less than 200 metres".¹⁴

It is important to mention here that while in the oceanic zone phytoplankton controls the productivity of the living organisms; in the neritic zone, plant communities such as marshes and mangrove swamps which grow intertidally, and fixed algae or seaweeds like rockweeds and

13. E.S. Perkins, The Biology of Estuaries and Coastal Waters, 1974, at p. 3.

14. M.B. Schaefer, "Symposium on the International Regime of the Seabed", Istituto Affari, Rome, June 30-July 5, 1969.

kelp, turtle and eel grasses that grow in shallow water, are among the primary producers, affecting the high productivity of the living resources in that zone. The occurrence of these primary producers is limited by light, which they require for photosynthesis, and for this reason they are restricted to depths where sufficient illumination exists. These plants are characteristic of the neritic zone.¹⁵

15. Biological aspects of the natural resources of the coastal or neritic zone, their identification and relationship to the continental shelf and their legal status have been discussed in Part Two (Chapters V and VI).

C- Definitions adopted by the 1958 Geneva Convention on the Continental Shelf ¹⁶

i. Definition of the Shelf

Generally speaking, there are two types of convention in international law: first, those which are based on existing customary international law. - That is to say, they regulate what is already, in practice, considered as a generally accepted rule; and second, those which are based on general practice in relation to which no uniformity or certainty as yet exists among States. In the latter case, a convention has the task of introducing a new concept or concepts as well as codifying established customs in the hope that the very existence of the convention will create uniformity regarding States' practice and will subsequently become law.¹⁷

This raises an important question concerning the legal nature of the 1958 Geneva Convention on the Continental Shelf. It is, in fact, a combination of the two general types: ie. the definition of the continental shelf is a new concept while the definition of its natural resources is partly new and partly based on a long existing

16. The Convention on the Continental Shelf, adopted 26 April, 1958, UN Doc Doc. A/CONF. 13/L. 55. Article 1 of the Convention on the Continental Shelf (which defined the continental shelf) was adopted by 51 votes to 9 with 10 abstentions by the Fourth Committee of the United Nations Conference on the Law of the Sea, see UNCLOS I, Official Records, Vol. VI, p. 47.

17. See International Law Association, Report of the Committee on the Development and Formulation of International Law, 42nd Conference, Prague, 1947, p. 86; see also Barry B.L. Auguste, The Continental Shelf, 1960, pp. 97-98.

custom among States.¹⁸

Article 1 of the Convention on the Continental Shelf signed by 46 States at Geneva in 1958, defined the continental shelf in the following terms:

"For the purpose of these articles the term 'continental shelf' is used as referring (a) to the seabed and subsoil of the submarine areas adjacent to the coast but outside the area of the territorial sea, to a depth of 200 metres or, beyond that limit, to where the depth of the superjacent waters admits of the exploitation of the natural resources of the said area;....".¹⁹

The wording of Article 1 clearly suggests that the definition of the continental shelf in the Convention is an arbitrary legal definition only "for the purpose of these articles", and it should, therefore, be construed and acted upon accordingly. It is obvious that the whole geological concept of the continental shelf, ie. the continuation of the land mass under the sea water is entirely missing from this definition and the 200 metre isobath,

18. See Article 2(4); for the full text of the Convention see UN Doc. A/CONF. 13/L. 55; UN Conference on the Law of the Sea, 2 Official Records, at p. 142; 52 AJIL (1958), p. 585. For the full discussion of the legal definition of the continental shelf and its natural resources see below Chapter IV.

19. For the 46 States which signed the Convention see UN Secretariat, Status of Multilateral Conventions of which the Secretary General acts as Depositary, p. xxxi. 21xi. 23 Doc. ST/LEG/3/Rev. 1. The Convention on the Continental shelf came into force on 10 June, 1964. By June 10, 1964 only 22 States deposited their instruments of ratification or accession, see Houston Lay, Robin Churchill and Myron Nordquist, New Directions in the Law of the Sea, Documents Vol. I, 1973, p. 101.

which is the average depth of the outer boundary of the continental shelf referred to in Article 1(a) above, has no real significance in this definition since it is coupled with the exploitability clause. The result of this exploitability clause is that if a State has the technological means to exploit the natural resources of the continental shelf beyond the 200 metre isobath the outer limit of the continental shelf becomes uncertain. It would perhaps be logical to assume that the exploitability clause was meant to operate only when the continental shelf does not cease to exist at 200 metre depth and continues beyond that limit to a greater depth. This assumption, though quite logical, cannot be supported because the right of coastal States to explore the continental shelf and exploit its natural resources, beyond 200 metres, is based not on the existence of the continental shelf, but on the states' technological capabilities.²⁰ In other words coastal States whose continental shelves extend beyond 200 metres cannot claim any rights unless they are technologically advanced and can, in practice, exploit their natural resources beyond that limit.

It is also important to note that the Convention does not make it clear as to whether the exploitation of the natural resources of the continental shelf, beyond 200 metres depth, is subject to the technology available in

20. Article 2(1) states: "The coastal State exercises over the continental shelf sovereign rights for the purpose of exploring it and exploiting its natural resources".

the world market or every coastal State has to prove its own capability. Furthermore, it is not clear whether the technological capabilities of one coastal State can determine the outer boundary of the continental shelf of all coastal States beyond 200 metres depth. Professor Brown, while examining the implications of the exploitability clause in Article 1(a) stated:

"Looking merely at the ordinary meaning of the language used in Article 1, it would seem, therefore, that a coastal State may claim that its Continental Shelf extends as far as it has the capacity to exploit the submarine areas, provided that there is continuity of exploitability".²¹

On the other hand Article 1(a), while deviating from the geological definition of the continental shelf, introduced the 'adjacency' criterion which has given rise to some controversial views on how the expression should be construed.²² It is admitted that 'adjacent' means 'lying near' or 'contiguous' and the latter has been defined as 'touching, adjoining and neighbouring'.²³

The definition of the term 'adjacent', however, does not bear any importance in itself, and Article 1 (a), while it refers to the rights of coastal States beyond 200 metres to where the depth of the superjacent waters admits of exploitation, leaves little if any, significance to be accorded to the literal meaning of the word.

21. E.D. Brown, The Legal Regime of Hydrospace, 1971, p. 8.

22. Ibid., pp. 5-6; Leo J. Bouchez, "The Outer Boundary of National Jurisdiction", Vol. II *Pacem in Maribus* (1970), pp. 50-67, at pp. 56-57.

23. See Concise Oxford Dictionary, 5th ed, 1964, 'adjacent'.

Another important problem caused by the exploitability clause is related to the legal significance of Art 2 Paragraphs 2 and 3 which state:

"2. The rights referred to in paragraph 1 of this Article are exclusive in the sense that if the coastal State does not explore the continental shelf or exploit its natural resources, no one may undertake these activities, or make a claim to the continental shelf, without the express consent of the coastal State.

3. The rights of the coastal State over the continental shelf do not depend on occupation, effective or notional, or any express proclamation".

The problem is that notwithstanding the strong wording of the above two paragraphs coastal States' sovereign rights are subject to actual exploration of the continental shelf and the exploitation of its natural resources. Although it is clear that if coastal States cannot fulfil this requirement no one else may do so without their express consent, it is not clear whether this also applies to the continental shelf beyond 200 metres. In other words, a developing coastal State whose continental shelf is the continuation of the landmass under the sea water cannot claim sovereign rights over its shelf beyond 200 metres depth while another opposite State whose continental shelf is not the continuation of the landmass under the sea water, with technological capabilities, can explore that area and exploit its natural resources.

The problem of the outer limit of the continental shelf finally remains unsolved since the 1958 definition of the continental shelf does not place any clear legal

restriction on the seaward limit of coastal States' sovereign rights over the submarine areas.²⁴

ii. Definition of Natural Resources

Article 2(4) of the 1958 Geneva Convention on the Continental Shelf defined the natural resources of the continental shelf in the following terms:

"The natural resources referred to in these Articles consist of the mineral and other non-living resources of the sea bed and subsoil together with living organisms belonging to sedentary species, that is to say, organisms which, at the harvestable stage, either are immobile on or under the sea bed or are unable to move except in constant physical contact with the sea bed or the subsoil".

The first part of Article 2(4) which refers to the mineral and non-living resources of the sea bed and subsoil of the continental shelf has not created any problem and all coastal States share the same views on this point. The second part of the Article which refers to the living organisms of the continental shelf, is vague and ambiguous and coastal States have taken different views regarding its definition, its interpretation and their rights to the living resources of the continental shelf.

24. According to Miron: "...the Department (of Interior of the US) has issued exploration permits permitting core drilling for areas in the Atlantic Ocean and the Gulf of Mexico as much as 200 miles from shore in water as deep as 4,300 feet. The Department has not announced a view as to where it believes its continental shelf jurisdiction ends". George Miron, "The Outer Continental Shelf - Managing or Mismanaging its Resources", Vol. 2, no. 2, Journal of Maritime Law and Commerce, January, 1971, pp. 267-288, at p. 268.

The phrase "living organisms belonging to sedentary species" used in Article 2(4) has neither a legal nor a biological basis.²⁵ From the legal point of view the concept of sedentary species in the light of state practice in international law before 1958 was limited basically to pearl, chank, sponge, beche-de-mer and oyster fisheries and there were only a few legislative acts relating to the above species.²⁶

On the other hand, in biological terms there does not exist any class, sub-class or order of living organisms known as 'sedentary'. The only reference made by a biologist to sedentary species is that by Perkins which defined the sedentary species as "those animals which are capable of movement, but do so infrequently".²⁷ The difference between Perkins' definition and that of Article 2(4) is that there is no suggestion of the permanent attachment to the sea bed or subsoil, nor is there any suggestion of constant physical contact with the sea bed and subsoil.²⁸

The expression 'sedentary fisheries' has been used by many international jurists since the beginning of this century and in all cases they meant certain species which

25. See below Chapter VIII (B) i.

26. See below Chapter II (B) State Practice Before 1945.

27. Perkins, Op. Cit., in note 13, at p. 162.

28. For full discussion on sedentary species, their locomotion and their legal status see below Chapter V Living Resources of the Continental Shelf.

were exploited by a few coastal States beyond the three mile limit of their territorial waters.²⁹ The definition of sedentary species based on locomotion has created a lot of problems concerning the interpretation of the definition. The ambiguities of the definition of sedentary species have already given rise to some disputes among States and since 1958 many coastal States have decided to protect the living resources of their continental shelves by unilateral declarations, including their own definitions of such resources.

The definition adopted by the 1958 Geneva Conference of the continental shelf and the natural resources were based, as will be shown, on the draft articles which had been prepared by the International Law Commission between 1951 and 1956.³⁰ By 1958 many coastal States had already asserted their rights over the continental shelf and its natural resources; thus the above definitions were adopted in an atmosphere of diverse political interests and were aiming at bringing some limit to many extravagant claims as well as establishing some uniformity regarding coastal States' rights over the continental shelf.

29. See below pp. 45-60.

30. See below pp. 122-174.

Conclusion

The term 'continental shelf' has a geological origin meaning the extension of the land mass under the seawater. While the width of the continental shelf varies from zero to almost 800 miles there is a general agreement among scientists as to the average depth of the continental shelf. The average depth is considered to be 200 metres. Geological characteristics of the shelf such as its topography and sediments are usually the same as those in the adjacent land.

The water covering the continental shelf is termed the 'neritic zone' and these zones are, by far, the most productive areas of the whole oceans. The relationship between the shelf and its superjacent waters is one of the most important factors contributing to the high biological productivity in the neritic zone.

The legal definition of the continental shelf developed, first through the unilateral declarations and then between 1951 and 1956 a definition was formulated by the International Law Commission. This definition, which did not take account of either geological concept of the shelf or its biological aspects, was adopted by the 1958 Geneva Convention on the Continental Shelf. This definition has not been accepted by all coastal States and therefore controversies have surrounded the definition of the shelf, the definition of its natural resources and the extent of the coastal States' rights over the continental shelf.

CHAPTER II

CUSTOMARY INTERNATIONAL LAW AND THE RIGHT OF STATES TO SUBMARINE AREAS

Introduction

In September, 1945 President Truman issued a Proclamation declaring that the natural resources of the continental shelf of the United States appertained to the United States and were, therefore, under its jurisdiction and control.¹ Although there had been a few references to the continental shelf and its resources before this proclamation was issued, they cannot be regarded as having introduced, still less as having created the doctrine of the continental shelf as it has been understood since 1945.²

The United States Proclamation was followed by a number of declarations asserting rights over the continental shelf and its natural resources by other coastal States.³ These proclamations, leaving aside the extent of the areas referred to as the continental shelf, were, according to the rights claimed, divided into two groups: first, States which followed the policy of the United States in their claims, that is, they claimed rights over the continental shelf for the purpose of exploiting its mineral resources and specifically stated that the rights claimed would not

-
1. Presidential Proclamation No. 2667, 28 September, 1945, Text in 10 Federal Register 12303; 13 Department of State Bulletin 485 (1945); UNLS, Laws and Regulations on the Regime of the High Seas, 1951, Vol. I, at pp. 38-39.
 2. See below pp. 65-72.
 3. For full discussion on the United States Proclamation see below pp. 72-86. For claims made by States

interfere with the generally accepted principle of the freedom of the high seas. Second, States which claimed not only the mineral resources of the seabed and subsoil of the continental shelf but also the living resources of its superjacent waters, thus excluding other States' rights to fishing within areas claimed.⁴

It is, therefore, necessary to examine briefly the state of international law regarding claims over the submarine areas and their resources before 1945 in order to evaluate the legality of the claims made to the continental shelf and its superjacent waters between 1945 and 1958. Furthermore, by examining customary international law in relation to the submarine area and its superjacent waters, it is hoped to establish whether the continental shelf doctrine existed even as a concept, before the United States Proclamation of 1945.

over the continental shelf and its resources between 1945 and 1958 see below pp. 86-116.

4. For the legal status of unilateral declarations in international law see below Chapter VII.

A- Acquisition of Territory

The right to acquire territory has been recognised in international law for a long time.⁵ "The acquisition of territory by a state", according to Oppenheim, "can mean nothing else than the acquisition of sovereignty over such territory".⁶ In the Island of Palmas Case, referred to the Permanent Court of Arbitration in 1928, Max Huber, the sole arbitrator, defined the term sovereignty as follows:

"Sovereignty in the relations between states signifies independence. Independence in regard to a portion of the globe is the right to exercise therein, to the exclusion of any other states, the function of a state".⁷

There are several distinct modes by which a State can acquire territory or exercise sovereign rights outside its own territory. They are: occupation, prescription,

-
5. L. Oppenheim, International Law, A Treatise, Vol. I, Peace, 1905, pp. 265-266; see also R.Y. Jennings, The Acquisition of Territory in International Law, 1962, Yehuda Z. Blum, Historic Title in International Law, 1965. A list of classic jurists' works on acquisition of territory is cited by Oppenheim, Op. Cit., in note 5, at p. 263.
 6. Oppenheim, Op. Cit., in note 5, at p. 266.
 7. Island of Palmas Case (1928) UN Reports on International Arbitral Awards II, p. 829, 22 AJIL (1928), pp. 867-912 at p. 875. Oppenheim's definition of sovereignty is as follows:
"Sovereignty is supreme authority, an authority which is independent of any other earthly authority. Sovereignty in the strict and narrowest sense of the term includes, therefore, independence all round, within and without the borders of the country", Oppenheim, Op. Cit., in note 5, p. 101. For the emergence and historical background to the theory of sovereignty see C.H. McIlwain, "A Fragment on Sovereignty", Vol. 48, no. 1, Political Science Quarterly (1933), pp. 94-106.

accretion, cession and subjugation.⁸ Among these modes of acquisition of territory occupation and prescription have, from time to time, been linked with the submarine areas and its superjacent waters outside the limit of territorial waters. It is, therefore, important to see whether such links had any legal significance for the doctrine of the continental shelf and the claims made between 1945 and 1958 regarding the continental shelf, its natural resources and its superjacent waters.

i. Occupation

When a territory is considered as res nullius, i.e. it does not belong to any state, it can be acquired by occupation and occupation is complete when a territory which does not belong to any state, or has been clearly abandoned, has been made subject to effective control.⁹

Oppenheim stated that:

"Occupation is the act of appropriation by a state through which it intentionally acquires sovereignty over such territory as is at the time not under the sovereignty of another state".¹⁰

He then distinguished between 'fictitious' occupation and 'real' or 'effective' occupation and stated that:

"Theory and practice agree nowadays upon the rule that occupation is effected

8. Oppenheim, Op. Cit., in note 5, p. 266, Blum, Op. Cit., in note 5, p. 3, D.P. O'Connell, International Law, second edition, Vol. One, 1970, pp. 405-443.

9. M. Akehurst, A Modern Introduction to International Law, second edition, 1973, p. 184.

10. Oppenheim, Op. Cit., in note 5, p. 275.

through taking possession of and establishing an administration over the territory in the name of and for the acquiring state".¹¹

What Oppenheim did not mention was the manner through which a State occupying a territory should achieve its two objectives of possession and administration.¹² In the Island of Palmas Case, the arbitrator made it clear that effective occupation would be recognised if it was conducted by peaceful means:

"...practice, as well as doctrine, recognises, though under different legal formulae and with certain differences as to conditions required, that the continuous and peaceful display of territorial sovereignty (peaceful in relation to other states) is as good as a title. The growing insistence with which international law, ever since the middle of the eighteenth century, has demanded that the occupation shall be effective would be inconceivable, if effectiveness were required only for the act of acquisition and not equally for the maintenance of the right".¹³

In the Legal Status of Eastern Greenland the Permanent Court of International Justice stated:

"...a claim to sovereignty based not upon some particular act or title such as treaty

11. Ibid., p. 276.

12. "No rule of the Law of Nations exists which makes notification of occupation to other Powers a necessary condition of its validity. But as regards all future occupation on the African continent the Powers assembled at the Berlin Congo Conference in 1884-1885 have, by Article 34 of the General Act of this Conference, stipulated that occupation shall be notified to one another, so that such notification is now a condition of the validity of an occupation in Africa", *ibid.*, p. 278.

13. The Island of Palmas Case (1928) UNRIAA, Op. Cit. in note 7, p. 839, 22 AJIL (1928) p. 876.

of cession but merely upon continued display of authority, involves two elements each of which must be shown to exist: the intention and will to act as sovereign and some actual exercise or display of such authority".¹⁴

Having defined the acquisition of territory (res nullius) through occupation it remains to be seen whether it can also be extended to the submarine areas beyond the limit of territorial waters. In his famous article "Whose is the Bed of the Sea" Sir Cecil Hurst referred to the following passage by Lord Hale which stated:

"The King hath the propriety as well as jurisdiction of the narrow seas, for he is in a capacity of acquiring the narrow and adjacent sea to his dominion by a kind of possession which is not compatible to a subject; and accordingly regularly the King hath that propriety in the sea: but a subject hath not nor indeed cannot have that propriety in the sea, through a whole tract of it, that the King hath; because without a regular power he cannot possibly possess it".¹⁵

Commenting on the above passage Sir Cecil Hurst noted that "The wide claims to jurisdiction over the narrow seas which this country made in the past have fallen into desuetude. There has been no formal renunciation of them and it is merely by disuse that they have lapsed".¹⁶ He then stated:

"The principle enunciated by Hall is that

14. PCIJ Rep, Series A/B no. 53 (1933) pp. 45-46.

15. Vol. 4, BYIL (1923-4), pp. 34-43, at p. 39. The above passage appeared in Hale's De Jure Maris (Chapter 6) and is cited by S.A. Moore in A History of the Fore-shore and the Law Relating Thereto, 1882, pp. 399-400, see also Geoffrey Marston, The Marginal Seabed: United Kingdom Legal Practice, 1981, p. 14.

16. Sir Cecil Hurst, Loc. Cit., in note 15, p. 39.

the true key to the development of the law is to be sought in the principle that maritime occupation must be effective in order to be valid".¹⁷

Later in his article he concluded that:

"So far as Great Britain at any rate is concerned, the ownership of the bed of the sea within the three mile limit is the survival of more extensive claims to the ownership of and sovereignty over the bed of the sea. The claims have become restricted by the silent abandonment of the more extended claims. Consequently, where effective occupation has been long maintained of portions of the bed of the sea outside the three mile limit, those claims are valid and subsisting claims entitled to recognition by other states".¹⁸

Sir Cecil Hurst based his argument on the exercise of sovereign rights by some coastal States over sedentary fisheries beyond the three mile limit of territorial waters. It is admitted that certain coastal States have exercised sovereignty over certain sedentary fisheries beyond their territorial waters, but to extend that right to the seabed and subsoil is an erroneous assumption which cannot be substantiated by either state practice or the opinion of jurists. In 1950, Professor Lauterpacht

17. Ibid. According to Hall the King had absolute sovereignty over the sea its bed and its subsoil. For full discussion on this point see Marston, Op. Cit., in note 15, pp. 22-24.

18. Sir Cecil Hurst, Loc. Cit., in note 15, p. 43.

Marston notes that: "The French jurist Fauchille is associated with this theory. Writing in 1925 he rejected the right of any other state to occupy the bed and subsoil of the marginal sea. He considered that the coastal state alone had the right to carry out such occupation, not because it was the proprietor under an existing title, but because the protection and security of its own territory demanded that states be excluded". Geoffrey Marston, "The Evolution of the Concept of Sovereignty over the Bed and Subsoil of the Territorial Sea", Vol. 48 BYIL (1976-7), pp. 321-332, at p. 331.

examined the question of sovereignty over submarine areas and, while referring to acquiring title over the submarine areas by occupation he stated:

"However, the defect of the attempt to base the title to submarine areas on occupation is not only one of logic. If 'occupation' thus conceived were the true basis of the legal claim to the adjacent submarine areas then there would be nothing save the extra-legal remedies of intervention or self-preservation on the part of the coastal state to prevent distant and strategically and economically powerful states from 'occupying' the adjacent submarine areas of other states by proclaiming their annexation and by emphasizing the 'effectiveness' of the title thus claimed to have been acquired by granting concessions, by legislating in respect of them, by concluding treaties with states willing to do so, relating to the submarine areas thus acquired and eventually, and after a long period of uncertainty, from proceeding to the actual exploitation, possibly in active competition with other states, of the submarine areas in question. Wide and disturbing possibilities of friction would thus be opened not only as between the coastal state and its more or less distant neighbours, but also between the neighbours themselves".¹⁹

In 1950 the International Law Commission in its Report to the General Assembly expressed its view regarding the continental shelf and stated that the right of coastal states over the continental shelf "was independent of the concept of occupation".²⁰ This view was finally incorporated in paragraph 3 of Article 2 of the 1958 Geneva Convention on the Continental Shelf.²¹

19. Sir Hersch Lauterpacht, "Sovereignty over Submarine Areas", 27 BYIL (1950) pp. 376-433, at p. 420; see also Blum, *Op. Cit.*, in note 5, pp. 326-327.

20. General Assembly, Fifth Session (1950), Supplement no. 12 (A/1316), p. 22.

21. See below Chapter IV.

As was pointed out earlier, the concept of occupation and its application to submarine areas was based on the existing state practice over certain sedentary fisheries. It will be submitted that such practice was not, in fact, based on the doctrine of occupation.

ii. Acquisitive Prescription

Prescription is generally of two kinds; extinctive prescription and acquisitive prescription:

"In law prescription is of two kinds: it is either an instrument for the acquisition of property or an instrument of an exemption solely from the servitude of judicial process".²²

The difference between extinctive and acquisitive prescription is that the former "does not establish in favour of the possessor a new title of ownership which had not been existing before", while the latter is a mode for acquiring a new title.²³ According to Johnson:

"The characteristic feature of 'extinctive' prescription as applied to property law is that, though the original possessor can no longer enforce them by action, his substantive rights are not abolished".²⁴

On the other hand, referring to acquisitive prescription

22. See Corpus Juris Secundum, Vol. 71 (1951), p. 490 cited by Blum, Op. Cit., in note 5 (p. 22), p. 6.

23. R.E. Megarry and H.W. Wade, The Law of Real Property, 2nd edition, 1959, p. 954, Blum, Op. Cit., in note 5 (p. 22), p. 6.

24. D.H.N. Johnson, "Acquisitive Prescription in International Law", 27 BYIL (1950), pp. 332-354, at p. 332.

he says:

"Its distinguishing feature is that the party who succeeds in establishing a title under this doctrine obtains a substantive right whilst the substantive rights (if any) of the previous possessor (if there is one) are abolished".²⁵

It is , therefore, acquisitive prescription as one of the modes of acquiring title which will be dealt with here in order to examine its application to the submarine areas.

Most classical jurists defended the necessity of the existence of prescriptive title in international law and the most common reason given by authorities such as Grotius, Vattel, Wheaton, Phillimore, Audient, Westlake, Hershey, Nys, Lawrence, Hall, Fauchille, Lindley, Verykios and Oppenheim²⁶ was "the need to preserve international order and stability".²⁷ According to Oppenheim:

"The basis of prescription in international law is nothing else than general recognition of a fact, however unlawful in its origin, on the part of the members of the Family of Nations".²⁸

Before elaborating on the meaning of 'general recognition' it is appropriate to examine the various categories of acquisitive prescription in order to see whether or not their status in international law are equal.

Johnson refers to two kinds of acquisitive prescription

25. Ibid.

26. Blum, Op. Cit., in note 5 (p. 22), pp. 12-15.

27. Ibid., p. 12; Johnson, Loc. Cit., in note 24 (p. 28), Pp. 333-334.

28. Oppenheim, Op. Cit., in note 5 (p. 22), p. 294. "...all legal systems have found it no less necessary to have a doctrine where legal validity can be given to titles to property that are either originally invalid or

and states:

"In the first instance, there is a form of 'acquisitive prescription' based, it is said, on 'immemorial possession'. The postulate of this form of prescription is that a state of affairs exists, the origin of which is uncertain. It is impossible to prove whether the origin of this state of affairs is legal or illegal. It is, therefore, presumed to be legal".²⁹

Referring to the second kind of acquisitive prescription he says:

"....there is a form of 'acquisitive prescription' more akin to the usucapio of Roman law. The conditions for the operation of usucapio in Roman law were:

- (a) A thing susceptible of ownership (res habilis);
- (b) A title of some kind (justus titulus), such as a sale, gift, or legacy, albeit a defective title;
- (c) Good faith (fides);
- (d) Possession (possessio), implying physical control (corpus) and the intention to possess as owner (animus);
- (e) The possession must be uninterrupted for a period of time defined by law (tempus)".³⁰

whose original validity it is impossible to prove", Johnson, Loc. Cit., in note 24 (p. 22), p. 332.

29. Ibid., pp. 334-335.

30. Ibid. Blum has discussed the concept of 'acquisitive prescription' in Roman private law as follows:
"Roman private law distinguishes between two forms of prescription:

- (a) usu capio;
- (b) possessio longi temporis.

Usu capio means 'the acquisition of ownership by continued possession for a certain time' and was available as a mode of acquiring title to property in cases 'where a person is in possession of property as owner, but without legal title. According to this doctrine, the possessor justo titulo and bona fide during two years of land and during one year of moveables acquired a property in the land or moveables which had not previously belonged to him..... The

Immemorial possession, according to Oppenheim, was accepted by Grotius. He says:

"Grotius rejected the *usu capio* of the Roman law, yet adopted the same law's immemorial prescription".³¹

It must, however, be pointed out that Grotius dismissed the application of immemorial possession in relation to

institution of *usu capio* was originally confined to *praedia Italia* and was available solely for Roman citizens. It was extended later to the provinces where it became known under the name of *possessio longi temporis*. Justinian blended together these two institutions and conferred the right of property on a person who had possessed moveables for three years and immovables for ten years *inter praesentes* and twenty years *inter absentes*, provided that the other requirements essential for the operation of *usu capio* or *possessio longi temporis* were complied with. Thus, both *usu capio* and *possessio longi temporis* confer upon a person the right of property which he did not have previously, curing thereby an originally defective title. Both are measured by a definite period of time, the length of which is fixed by law. In addition to these two forms of prescription there was in existence another kind of prescription, indefinite in time, which was available when the origin of possession was not capable of proof, i.e. when nobody could recollect that it had belonged to another person. This kind of prescription, known as *vetustas* or *antiquitas* does not, in itself, confer a right of property on the possessor, but raises a presumption of possession in his favour, thus relying on a principle resembling the well-known legal maxim *omnia praesumuntur rite esse acta*. Thus presumption is not rebuttable and 'facts which indicate an unlawful origin, rebut the presumption of immemoriality'. It should be mentioned, however, that while *usu capio* and *possessio longi temporis* were resorted to solely as private law institutions, *vetustas*, on the other hand, found its application mainly in cases in which rights of public character were affected (eg. rights relating to public ways or water courses)". Blum, *Op. Cit.*, in note 5 (p.23), pp. 9-10.

31. Oppenheim, *Op. Cit.*, in note 5 (p. 22), p. 293.

the sea when he stated that:

"...prescription based on no matter how immemorial a time, sets up no title to those things which are recognised as common to the use of mankind. One reason among others which can be given for this definition is that any one who uses a res communis does so evidently by virtue of common and not private rights, and because of the imperfect character of possession he can, therefore, no more set up a legal title by prescription than can a usufructuary".³²

The following passages from Grotius' De Jure Belli ac Pacis, have been quoted by Blum to prove that Grotius eventually accepted the validity of immemorial possession in international law:

"... because a length of time exceeding the memory of man is in its essential character practically infinite, a silence for that length of time will always seem sufficient to imply abandonment of ownership, unless there are very strong reasons to the contrary".³³

"Possession beyond the limits of memory not interrupted nor called in question by appeal to the courts, should absolutely transfer ownership".³⁴

In the above two passages the language of Grotius is

-
32. Hugo Grotius, The Freedom of the Seas, Translated by Ralph Von Deman Magoffin, 1916, p. 50. He also stated that: "...in cases where the law absolutely does away with all prescription, not even such a tremendous lapse of time is accepted as a pertinent factor; that is to say (if we may borrow the explanation of Felinus) an object which is imprescriptible does not become prescriptible merely because of the passage of time immemorial", De Iure Praedae Commentarius, translated by G.L. Williams, 1960, Chapter XII Paragraph 109, p.247.
33. Blum, Op. Cit., in note 5 (p. 28) p. 16.
34. Ibid.

clear. He talks of 'abandonment of ownership' both of which terms indicate that he is referring to things which can be possessed, owned and abandoned, and the sea is not, therefore, the subject of his statement.³⁵

Vattel, while defending the freedom of the seas, stated:

"Since the rights of navigation and fishing and other rights which are exercised on the sea are classed among those rights which may be exercised at will (*jura merae facultatis*) and which are not subject to prescription, they cannot be lost by non-user. Hence, although it should happen that a nation had been, from time immemorial, the only one to exercise the right of navigation or fishing in certain seas, it could not on that ground claim an exclusive right; for the fact that other nations did not use their common right of navigation or fishing in the waters in question does not lead to the conclusion that they agreed to renounce their right, and they may still use it as often as they please".³⁶

The above statement by Vattel shows that, as far as the freedom of the seas was concerned, his views were in complete conformity with those of Grotius. Vattel, however, acknowledged that there could exist an exclusive right over the seas when he stated that:

35. For immemorial right see Sir Gerald Fitzmaurice, "The Law and Procedure of the International Court of Justice, 1951-1954: Points of Substantive Law, Part II" 32 BYIL (1955-6), pp. 34-37.

36. E. De Vattel, The Law of Nations or the Principles of Natural Law, Applied to the Conduct and to the Affairs of Nations and of Sovereigns, 1758, Translated by Charles G. Fenwick, 1916, Book I, Chapter XXIII, The Sea, s. 231, p. 107.

"...it can happen that a non-user may take on the character of consent, or implied agreement, and thus become a title in favour of one nation as against another. When a nation is alone in exercising the right of navigation and fishing in certain waters, and claims an exclusive right, and forbids others to exercise their right, if they obey the prohibition with sufficient signs of acquiescence they implicitly renounce their right in favour of the other nation and give it an exclusive right which it may lawfully maintain against them in future, especially when that right is confirmed by long usage".³⁷

The most important element in Vattel's statement is the actual claim of an exclusive right by a nation. Such a claim must be followed by actual implementation of the claim to the extent that the claimant nation "...forbids others to exercise their right". Here the duration of the exercise of an exclusive right is irrelevant unless the claim had originally manifested the intention of the claimant state.³⁸ It is then up to other states to react to a claim of such character. "If", according to Vattel,

-
37. Ibid, s. 286. He also noted that:
"...as every one is free to renounce his right, a nation may acquire exclusive rights of navigation and fishing by treaties in which other nations renounce in its favour the rights which belong to them by nature. The latter was bound to observe such treaties, and the nation in whose favour they are made has the right to keep possession of its advantages by force". Ibid, s. 284, p. 107.
38. This important element, i.e. claim, in Vattel's statement seems to have been overlooked by some writers. Hall, for instance stated:
"Title by prescription arises out of a long continued possession, where no original source of proprietary right can be shown to exist, or where possession in the first instance being wrongful, the legitimate proprietor has neglected to assert his right or has been unable to do so". R.G. Hall, International Law, 8th edition, 1924, p. 143.

"they obey the prohibition with sufficient signs of acquiescence they impliedly renounce their right" and thus a title will be established "which it may lawfully maintain against them in the future, especially when that right is confirmed by long usage". It is interesting to note that 'long usage' is only an operative part after acquiescence. It is not, by itself, a basis for prescriptive title.

It was pointed out earlier that according to Oppenheim, "...general recognition of a fact, however unlawful in its origin, on the part of the members of the Family of Nations" is the basis of prescription. Thus, if a claim has been challenged by other interested states by protests or other diplomatic means, the title cannot be acquired.³⁹

The concept of acquisitive prescription in international law has been discussed inter alia by Johnson who gives the following definition:

"'Acquisitive Prescription' is the means by which, under international law, legal recognition is given to the right of a state to exercise sovereignty over land or sea territory in cases where that state has, in fact, exercised its authority in a continuous, uninterrupted, and peaceful manner over the area concerned for a sufficient period of time, provided that all other interested and affected states (in the case of land territory the previous possessor, in the case of sea territory neighbouring states and other states whose maritime interests are affected) have acquiesced in this exercise of authority. Such acquiescence is implied in cases where the interested and affected states have failed within a reasonable time to refer the matter to the appropriate international organisation

39. See below Chapter VII "Legal Status of Unilateral Declarations in International Law".

or international tribunal or, exceptionally in cases where no such action was possible, have failed to manifest their opposition in a sufficiently positive manner through the instrumentality of diplomatic protests. The length of time required for the establishment of a prescriptive title on the one hand, and the extent of the action required to prevent the establishment of a prescriptive title on the other hand, are invariably matters of fact to be decided by the international tribunal before which the matter is eventually brought for adjudication".⁴⁰

The above definition of acquisitive prescription is an accomplished version of Vattel's views based on renunciation of the rights enjoyed by other states in favour of one state. Whether 'acquisitive prescription' can also be applied to the submarine areas is, however, another matter. Coastal state sovereignty over submarine areas, even within the three mile limit of the territorial sea, was, until the end of the last century, a controversial issue.⁴¹ The right of coastal states with regard to the submarine areas was discussed by many jurists in relation to the exploitation of sedentary fisheries.⁴² This right was sometimes extended beyond the generally accepted three mile limit of territorial sea. Thus referring to Gidel's views

40. Johnson, Loc. Cit., in note 24 (p. 22), pp. 353-354.

41. See below Chapter VI "Non-living Resources of the Continental Shelf".

42. For full discussion on state practice before 1945 see below (B) "State Practice Before 1945". See also below Chapter VIII "The Disputes" under (B) i "Legal Definition of Sedentary Species Before 1958".

regarding the freedom of the high seas, Johnson said:

"Gidel, for whom the freedom of the seas was such an overriding principle that he could not even bring himself to regard the seabed as *res nullius* capable of occupation, would only allow states to claim title to sedentary fisheries outside the maritime belt on a basis of prescription involving the acquiescence of other states. Sedentary fisheries for him were an exception to the primary rule of the freedom of the seas and states could only exercise jurisdiction over them on certain conditions".⁴³

There are two important points in the above statement which must be clarified. First, the title by prescription was confined to sedentary species; it was not a general title to the submarine areas. Secondly, this right could only be granted, assuming all other conditions were met, to coastal states outside their territorial seas. This condition automatically reduced the scope of prescription in its application to the seabed. In other words, prescriptive title, which could, and still can, be enjoyed by all nations regarding land territories, could be enjoyed with regard to the sea only by coastal states in areas outside their own territorial sea.⁴⁴ It is, however, in the light of the restricted application of acquisitive prescription on the one hand and state practice supporting such restrictions on the other that doubts have arisen as to whether acquisitive prescription, as a rule of customary

43. Johnson, *Loc. Cit.*, in note 24 (p. 28), pp. 351-352.

44. See Vattel's views on shells, pearls and amber where he argues that such species are exhaustible and, therefore, can be, in the areas adjacent to the coast, subject of ownership, *Op. Cit.* in note 36 (p. 33), sects. 287 and 288, pp. 107-108.

international law, has any application to the submarine areas. Professor O'Connell in an article entitled "Sedentary Fisheries and the Australian Continental Shelf" examined the right of coastal states over their sedentary fisheries in relation to the submarine areas and stated:

"It is universally admitted that certain states do exercise sovereignty over pearl and sponge fisheries, but various explanations of the origin of their rights are current. The British government has defined the rights of Ceylon as based on 'immemorial user'. Australia has likewise, without making any specific claims, considered as exceptional to the regime of the high seas 'sedentary fisheries for pearl oysters and beche-de-mer, etc, on certain portions of the sea bottom outside the three mile limit, which, by long usage, have come to be regarded as the subject of occupation and property. Does this imply, as some writers maintain, that prescription is recognised by the United Kingdom and Australia to be the basis of appropriation of the sea bed? Prescription, as traditionally conceived, would seem to have no place in the regime of the sea. It is difficult to perceive how there can be prescriptive rights to either *res nullius* or a *res communis*. In either case, against whom can an adverse interest arise?".⁴⁵

Although Professor O'Connell did not accept the application of acquisitive prescription to the submarine areas, he considered the seabed as *res nullius* and capable of occupation.⁴⁶ Title to the submarine areas by

45. 49 AJIL (1955) pp. 185-209, at pp. 188-189.

46. Ibid., pp. 208-209. Both Oppenheim and Smith regarded the seabed and the subsoil of the submarine area beyond the three mile limit capable of occupation. See Oppenheim, International Law, Vol. I (7th edition by Lauterpacht, 1948), pp. 575-578 and H.A. Smith, Great Britain and the Law of Nations, Vol. II, 1935, p. 122.

occupation has already been discussed and dismissed elsewhere in this work.⁴⁷

iii. Historic Rights

Occupation, as a basis of acquiring title to submarine areas, was rejected by some jurists and it was decided by the International Law Commission that the rights of coastal states to submarine areas adjacent to their coasts, but outside their territorial seas, were not based on the doctrine of occupation. This view was adopted by the 1958 Geneva Convention on the Continental Shelf.⁴⁸

Title by prescription is, as explained above, title to sovereignty. In this respect the exclusive rights of some coastal states over a few species of sedentary animals on the bed of the sea cannot be considered as prescriptive title to the seabed itself, thus bringing the latter under sovereignty.⁴⁹ These kinds of rights exercised by a few states regarding sedentary species before the emergence of the continental shelf doctrine, and both before and since by some other states regarding fishing in some areas of the high seas, have now been identified as 'historic rights'. Professor O'Connell defined the term 'historic

47. See above under "Occupation" at pp. 23-28. See also Johnson, *Loc. Cit.*, in note 24 (p. 22), pp. 352-353.

48. See below Chapter IV "United Nations and the First Conference on the Law of the Sea".

49. Referring to sedentary fisheries, Professor Brownlie stated: "Sedentary fisheries, such as pearl and chank are capable of possession: but it is probable that the rights obtained are less than sovereignty". Ian Brownlie, Principles of Public International Law, 2nd edition, 1973, pp. 171-172.

rights' as meaning:

"...title created in derogation of international law through historical processes by which one state has asserted a jurisdiction originally illegal, and this has been acquiesced in by the community of nations".⁵⁰

Perhaps one of the most important differences between the concept of 'historic rights' and 'prescriptive title' is the manner by which the reactions of other states are exhibited. Thus, according to Sir Gerald Fitzmaurice, if there is an element of express consent, or implied consent based on the conduct through which consent "can clearly be inferred", there is no question of historic rights.⁵¹ Sir Gerald Fitzmaurice, however, refers to a third kind of reaction which constitutes the very substance of the concept of 'historic rights'. He states:

"Where, however, other states have neither consented expressly, nor by their conduct, actively implied their consent, but have simply been inactive, only the historic element in a claim can supply the necessary presumption of (tacit) acquiescence arising out of the fact that the practice in question has continued for a long time without encountering active opposition (if such be the case). Thus, as was pointed out in the United Kingdom argument in the Fisheries Case, the true role of the theory is to compensate for the lack of any evidence of express or active consent by states, by creating a presumption of acquiescence arising from the facts of the case and from the

50. D.P. O'Connell, International Law, 2nd edition, 1970, Vol. One, p. 421. He also stated:

"The doctrine of historic rights, in short, can only be resorted to in order to explain a specific appropriation of the sea bed where a special regime has been established by positive practice of nations as a derogation from general principles", Loc. Cit., in note 45 (p. 38), p. 189.

51. Sir Gerald Fitzmaurice, "The Law and Procedure of the

inaction and toleration of states. But of course it is still this presumed acquiescence, not the usage per se which creates the right. Moreover, the historic element only creates a presumption of acquiescence. It remains open to any state against which the claim is invoked to rebut this presumption if it can, and to show that in all the circumstances it cannot be held to have consented".⁵²

Another important difference between prescriptive title and historic rights is related to the extent of rights acquired under the above two doctrines. The former establishes sovereignty in favour of the prescribing state or states while the latter is based on 'non-exclusive historic rights'. "By non-exclusive rights", says Blum, "we understand rights falling short of sovereignty".⁵³ This follows the argument that the high seas is *res communis* and, therefore, open to all nations. If title cannot be proved by either express consent or implied consent through the conduct of other states, mere refraining from exercise of the rights cannot be assumed to be acquiescence.⁵⁴ Although such refraining would not lead to the establishment of a prescriptive title, it would, however, lead to the establishment of non-exclusive historic rights.⁵⁵ Thus,

International Court of Justice, 1951-54: General Principles and Sources of Law", 30 BYIL (1953), pp. 1-70, at p. 29.

52. Ibid., pp. 29-30.

53. Blum, Op. Cit., in note 5 (p. 28) p. 311.

54. See statement by Vattel cited above at p. 33.

55. See below Chapter VIII "The Dispute" under (B), "The Dispute Between Japan and the United States".

the claims over a few sedentary species in their relation to certain banks outside the three mile limit of the territorial waters may now be considered as non-exclusive rights to the sea bed itself on the ground that such claims, as far as the sea bed was concerned, were limited. According to Sir Gerald Fitzmaurice:

"There may be cases where, because the right in question is claimed on a non-exclusive basis, the acquiescence, express or tacit, of other states need not be shown, and the fact of the historic exercise of the right suffices per se".⁵⁶

It is admitted that certain coastal states did exercise exclusive rights over their sedentary fisheries outside their territorial seas and, no doubt, sedentary species were considered as subject to ownership, but ownership over sedentary fisheries was not equivalent to sovereignty over the sea bed. As regards the legal basis upon which some coastal states exercised their exclusive rights over certain sedentary fisheries before the emergence of the continental shelf doctrine, it is not possible to say whether those rights were based on occupation or prescription.⁵⁷

It is important to note that the reactions of the international community to those few claims over sedentary

56. Loc. Cit., in note 51 (p. 40), p. 30.

57. The views expressed by the members of the ILC during its 1951 Session were divided on the issue. See Yearbook of International Law Commission, 1951, Vol. I, pp. 316-319; see also below Chapter VIII "The Disputes" under (B) i "Legal Definition of Sedentary Species Before 1958".

fisheries were such as could be described as an 'indifferent' attitude. There are two features which substantiate this view. First, the exploitation of sedentary fisheries was based on local tradition or custom, the extent of which was so limited that other states did not consider it either to interfere with, or limit their rights. Second, the species involved were mainly those which had to be collected by divers and, therefore, it was more or less a craft which had developed locally. In this context, states interested in the exploitation of sedentary fisheries did not object to those claims because either they did not want to risk their own claims, or considering geographical distances, they considered it impossible to exercise their rights by sending divers to those areas. Referring to the juridical basis of claims to sedentary fisheries the following statement by Blum seems relevant:

"...it would appear that process of formation of these rights is, in fact, identical with that observed in the emergence of historic rights in general, namely, assertion of exclusive state authority, on the one hand, and acquiescence in such exercise of authority on the other hand".⁵⁸

However, as far as the submarine areas were concerned, it is best to put the claims over sedentary fisheries in relation to the sea bed in the category of non-exclusive

58. Blum, *Op. Cit.*, in note 5 (p. 28), p. 332.

historic rights.⁵⁹

-
59. Whether the ILC was of the opinion that the right of coastal states over sedentary fisheries outside the limit of the territorial sea was based on 'non-exclusive historic rights' is not clear, but there is no doubt^{as} to the meaning of the following article, adopted by the Commission in 1951, on sedentary fisheries:

"The regulation of sedentary fisheries may be undertaken by a state in areas of the high seas contiguous to its territorial waters, where such fisheries have long been maintained and conducted by nationals of that state, provided that non-nationals are permitted to participate in the fishing activities on an equal footing with nationals. Such regulation will, however, not affect the general status of the areas as high seas". Emphasis added, Yearbook of ILC, 1951, Vol. II, p. 143 (Part II. Related Subjects). The draft articles on the Continental Shelf and Related Subjects prepared by the ILC at its 3rd Session in 1951 were communicated to various Governments. Only the United Kingdom Government noted the problem presented by the draft article 3 on sedentary fisheries. In its comments on the latter part of the draft article it was stated:

"In the opinion of Her Majesty's Government, it depends on the historical facts of each case whether or not non-nationals are permitted to participate in the fishing activities on an equal footing with nationals. Where the coastal state has in the past permitted non-nationals to participate in the fishing, then there is no right to exclude such non-nationals in the future; where, however, the coastal state has in the past reserved the fishing exclusively for its own nationals, then non-nationals have no right under international law to participate in the fishing in the future". Yearbook of ILC, 1953, Vol. II, p. 268.

B- State Practice Before 1945

i. Exploitation of the Resources of the Seabed

1. Pearl and Chank Fisheries

The first legislation regarding the exploitation of the resources of the sea bed was the British Colonial Act of 1811.⁶⁰ This Act referred to the pearl banks of Ceylon and stated:

"Whereas there is reason to suspect that deprivations are committed in the pearl banks of this Island by boats and other vessels frequenting those places in the calm season without any necessity or lawful cause for being in that situation:

If any boat or other vessels shall, hereafter, between the 10th of January and the end of April, or between the 1st of October and the end of November, in any year, be found within the limits of the pearl banks, as described in the schedule hereunto annexed, anchoring or hovering and not proceeding to their proper destination, as wind and weather may permit, it shall be lawful for any person or persons holding a commission or warrant from His Excellency the Governor for the purposes of this Regulation to enter and seize such boat....and every such boat or other vessel is thereby declared liable to forfeiture by sentence of any court having revenue jurisdiction of sufficient amount..."⁶¹

The Schedule annexed to the Regulation No. 3 stated:

"Vessels navigating the outer passages are not to hover or anchor in deeper than four fathoms of water.

Vessels navigating the outer passage are not to hover or anchor within twelve fathoms of water".

60. A Revised Edition of the Legislative Enactment of Ceylon, Vol. I, A.D. 1707-1888, Colombo, 1923.
"Regulation No. 3 of 1811 - For Protection of His Majesty's Pearl Banks of Ceylon", *ibid.*, p. 51.

61. *Ibid.*

The above Ordinance, as it clearly shows, did not exclude foreigners from engaging in pearl fisheries in the designated areas. It simply prohibited any navigating vessels from hovering or anchoring in those areas. Furthermore, the Act was applicable to navigating vessels only and for the periods referred to in the Act. In fact, it was not until Regulation No. 17 of 1906 entitled, "The Pearl Fishery Ordinance, 1906" was enacted that the exclusive right of the Crown over pearl banks was declared.⁶²

It would, however, be misleading to conclude that prior to the Pearl Fishery Ordinance of 1906, the exclusive right of the Crown over pearl fisheries was in any doubt. The exploitation of the pearl fisheries had been practised by the Dutch and the Portuguese long before the British became rulers of the Island.⁶³ The opinion of Mr. Hope, the Law Officer to the Crown, of 4 January, 1844, reflected the above view:

"With reference to the request of the Governor of Ceylon in the first mentioned dispatch to be informed in what manner he is to provide in respect to these banks beyond the limit of 3 miles from the shore of the Colony, being the limit within which the

62. Ibid., pp. 57-58. This Act was amended by No. 14 of 1918 and proclaimed in August 30, 1918. Ibid., p. 57; see also Government Gazette no. 6,963 of August 30, 1918.

63. Hurst, Loc. Cit., in note 15 (p. 25), pp. 40-41. As early as 1758 Vattel had asked "who can doubt that the pearl fisheries of Bahrain and Ceylon may be lawful objects of ownership?". Op. Cit., in note 36 (p. 33), at p. 107. In 1923 the Under Secretary of State for Colonies made the following statement in

local jurisdiction has been decided by the Opinion of the Law Officer to be restricted, I am directed by the Lords to state that perceiving from your letter of the 1st ultimo, that ever since Ceylon came into possession of Great Britain (and as far as Lord Stanley is aware) during the possession of the Island by the Dutch, the pearl banks were considered as forming part of it, were fished either on account of, or under licence from, the Government of Ceylon for the time being. My Lords are disposed to think that it is competent to the same legislative authority which makes Law for the Island of Ceylon, also to make Laws extending, in point of operation to the pearl banks, and that presuming these portions of the bottom of the sea indicated in the Schedule to the Ordinance no. 3 of 1811, to be the pearl banks in question, My Lords conceive that such Ordinances would not be invalid by reason of such Banks being situated beyond the limit of three miles from the shore".⁶⁴

It is evident from the above statement and many other statements relating to other fisheries of a sedentary nature that the regulations themselves were not the source of creating a new legal regime regarding sedentary fisheries.⁶⁵ They only formulated what was already in

the House of Commons to the effect that the special claims to the pearl fisheries are not inconsistent with the three mile limit, but are justified by "rights over the fisheries enjoyed in uninterrupted and undisputed proprietorship by successive rulers, native, Portuguese, Dutch and British since a period prior to the development of the doctrine of the three mile limit". 163 Par Debate (1923) Commons, Cols. 993 and 1346-7; Philip C. Jessup, The Law of Territorial Waters and Maritime Jurisdiction, 1927, pp. 16-17.

64. D.P. O'Connell and Ann Riordan, Opinions on Imperial Constitutional Law, 1971, p. 195.

65. In their opinion of 19 December, 1893, the Law Officers, with reference to the question whether the Government of Burmah was entitled to extend its jurisdiction over the pearl fisheries beyond the three mile limit, stated: "The Australian Pearl Fishery Acts are limited in their

existence.⁶⁶ There is no doubt that sedentary fisheries were subject to local regulations, but what is not clear is the extent of the rights claimed. It is clear that in Ceylon, long before the Regulation no. 3 of 1811 was enacted, a licensing system was in operation, but it is not clear whether foreigners were at all involved in such activities. The Ordinance of 1811 is also silent on that subject.

Although the right to exploit certain sedentary fisheries was based on immemorial possession, the regulations regarding the exploitation of such fisheries gradually expanded the nature of the practice. Thus, while there is nothing in the Regulation no. 3 of 1811 to suggest limitations on actual exploitation, the Regulation no. 18 of 1843 prohibited the possession of:

"...drifting net or other net, not being such as are used by men walking in the sea, or of any dredge or similar instrument, at any place within twelve miles of Tallaville or Talamar, or at any place within twelve miles of any part of the shore".⁶⁷

operation to British subjects, and we assume that in the case of the pearl fisheries in the Mergui Archipelago, there has not been, as in the case of the Ceylon fisheries, an immemorial claim to the pearl oyster fishery beyond the usual territorial waters asserted by successive rulers and acquiesced in", Lord McNair, International Law Opinions, Vol. I Peace, 1956, p. 260; O'Connell and Riordan, Op. Cit., in note 64 (p. 47), pp. 206-207.

66. It will be shown, by reference to the Pearl Fishery Ordinance of 1906, how much those regulations formulated the actual practice.

67. See Regulation no. 18 of 1843, "To declare illegal the possession of certain nets and instruments within certain limits". A revised edition of the Legislative

The penalty for breach of the above regulation was a fine of ten Pounds or six months imprisonment with hard labour.⁶⁸ Again, there was nothing in the above Ordinance to suggest that the exclusive right to exploit pearl fisheries had been claimed. In other words, the right to regulate the exploitation of pearl fisheries was distinct from the exclusive right of exploitation itself.

It has already been mentioned that the exclusive right over the pearl fisheries was claimed in 1906. But before examining the extent of the right claimed in the Pearl Fishery Ordinance of 1906, it is relevant to refer to the Regulation no. 18 of 1890 entitled "The Chank Ordinance, 1890".⁶⁹ This regulation referred to chanks, beche-de-mer, coral and shells in the seas between Mannar and Chilaw.⁷⁰ The purpose of this Ordinance was both to control the export of chanks and to regulate its exploitation. Thus, section 4 (1) states:

"There shall be levied and paid on all chanks entered for exportation a royalty at such rate not exceeding one cent on each chank".⁷¹

And section 4 (2) stated:

"No chanks shall be exported save and except from any part mentioned in the

Enactment of Ceylon, Vol. I, Op. Cit., in note 60 (p. 45), p. 52.

68. Ibid.

69. Ibid., pp. 52-55.

70. The designated areas were referred to in Sch. B as "Eastward of a straight line drawn from a point six miles westward of Talaimannar to a point six miles westward from the shore two miles south of Talaivilla". Ibid., p. 55.

71. Ibid., p. 53.

schedule A hereto, or from any other which the Governor in Executive Council may appoint by notification in the Government Gazette".⁷²

Section 9 stated:

"It shall not be lawful for any person to fish for, dive for, or collect chanks, beche-de-mer, coral, or shells in the seas within the limits defined in Schedule B... and every person who shall fish for, dive for, or collect, or who shall use or employ any boat, canoe, raft, or vessel in the collection of chanks, bech-de-mer, coral, or shells in the said seas be guilty of an offence.....".⁷³

It is evident that the provisions of section 9 would apply also to any foreigners engaged in the exploitation of chanks and so on.⁷⁴ Thus, the above Ordinance was the first to lay down regulations which were equivalent to a claim to sovereignty regarding chanks, beche-de-mer, coral and shells in Ceylon. Perhaps the most important part of the Ordinance of 1890 regarding the claim over chanks and so on in its relation to the seabed was the second proviso in Section 9 which stated:

"...it shall be lawful for the Governor in Executive Council from time to time, by notification in the Government Gazette, to alter the limits defined in Schedule B hereto, or exempt any portion or portions of the seas within the said limits from the operation of this Ordinance".⁷⁵

The above proviso indicates that the exclusive right over chanks, beche-de-mer, coral and shells was based on the localities where they were usually found, but since

72. Ibid. The ports mentioned in Sch. A were Kankesan-turia, Kayts, Jaffina and Pesalai. Ibid., p. 55.

73. Ibid., p. 54.

74. In Mortensen v. Peters (1906) 8 Fraser, J. Lord

there could be no guarantee of the settlement of such species in the same locations the Governor was empowered to change the limits if necessary.⁷⁶ This is another proof that claims over sedentary fisheries were based on the species wherever they were found and not on certain portions of the sea bed.⁷⁷

It was stated earlier that it was not until 1906 that the exclusive right over pearl fisheries off the coasts of Ceylon was claimed.⁷⁸ Section 3 of the Pearl Fishery Ordinance of 1906 as amended by No. 14 of 1918 stated:

"The exclusive right of fishing for and taking pearl oysters off the coasts of Ceylon and in all bays and inland waters of the Island is vested in the Crown".⁷⁹

Dunedin stated:

"The words 'any person' must be taken to include persons of any nationality". Ibid., at p. 98.

75. Regulation no. 18 of 1890, see above pp. 49-50.
76. Chank is the shell of Turbinella Rapa, a gastropod belonging to the Class Mollusc. For the biology of this and other species in the Gulf of Mannar see Edgar Thurston, Notes on the Pearl and Chank Fisheries and Marine Fauna of the Gulf of Mannar, Madras, 1890. See also below Chapter V (C), (i) Gastropoda.
77. Chanks Ordinance of 1890 was amended by Ordinance No. 2 of 1929; article 8 (b) of the latter Ordinance gave the same power to the Governor to alter the limits defined in the Sch. B as it had done in Section 9 of the Ordinance of 1890. Legislative Enactment of Ceylon, Revised Edition, 1938, Vol. 4, C. 185, p. 517; United Nations Legislative Series, Laws and Regulations on the Regime of the High Seas, Vol. I, 1951, pp. 58-59.
78. Regulation No. 17 of 1906, "The Pearl Fishery Ordinance, 1906", A Revised Edition of the Legislative Enactment of Ceylon, Op. Cit., in note 60 (p. 45), pp. 57-58
79. The Pearl Fishery was proclaimed from August 30, 1918 in Government Gazette No. 6,963 of Aug. 30, 1918.



Section 4 (1) stated:

"The Governor in Council may, from time to time, by Proclamation declare that it shall be unlawful for any person within the limits named in the Proclamation to fish or dive for, or collect, or to use or employ any boat, canoe, raft, or vessel whatsoever for collecting pearl oysters or any specified kind of pearl oysters without having first obtained a license in that behalf from the Government Agent or from some person duly authorised by him to grant licenses".⁸⁰

The Pearl Fisheries Ordinance of Ceylon of 12 February, 1925 was essentially the same as the Pearl Fishery Ordinance of 1906.⁸¹ Section 2 of the Pearl Fisheries Ordinance of 1925 defined the pearl bank as:

"...the areas from time to time specified in the first schedule and includes the bed of any pearl bank. The said schedule may from time to time be altered by regulation".⁸²

It is clear, as in the case of chanks, beche-de-mer, coral and shells, that the claim is based primarily on pearl-bearing species and not on the sea bed. In other words, the exclusive right would, if necessary, follow the the species wherever they were found and did not apply to certain portions of the sea bed.

It has already been mentioned that the regulations regarding sedentary fisheries were only declaratory of existing customs and not a source of custom themselves. Thus, in the case of pearl fisheries in both Australia and Burmah, when attempts were made by the local authorities

80. The Pearl Fishery Ordinance, 1906, UNLS, Laws and Regulations on the Regime of the High Seas, Op. Cit., in note 77 (p. 51), p. 57.

81. UNLS, Laws and Regulations on the Regime of the Territorial Sea, 1957, pp. 459-460.

82. Ibid., p. 459.

to regulate the pearl fisheries outside the three-mile limit, the law officers of the Crown made it clear that the enforcement of such regulations against foreigners would be contrary to international law:

"It would be possible to legislate so as to bind British subjects beyond those limits, but it would not be possible to bind foreigners, or to exclude them...

The Australian Fishery Acts are limited in their operation to British subjects, and we assume that, in the case of the pearl fisheries in the Mergui Archipelago, there has not been, as in the case of the Ceylon fisheries, an immemorial claim to the pearl oyster fishery beyond the usual territorial waters..."⁸³

Finally, we may refer to a local regulation of 1901 by France regarding the pearl banks of the Gambier Archipelago in French Oceania. This regulation modified earlier instruments and excluded foreigners from those pearl banks.⁸⁴

2. Other Sedentary Fisheries

In his Second Report on the Regime of the High Seas to the International Law Commission, Mr. François referred to the exclusive right of Tunisia over sponge fisheries beyond the three mile limit.⁸⁵ It was stated that the Government of Tunisia reserved the sponge fisheries in a zone off its coast in Article 29 of the instruction of 31 December, 1904.⁸⁶ It must be pointed out that the

83. Opinions on Imperial Constitutional Law, Op. Cit., in note 64 (p. 47), p. 207. For the background to Australian Fishery Acts, see below Chapter VIII (A) (iii), "Dispute Between Japan and Australia".

84. Second Report on the Regime of the High Seas, UN Doc.A/C.N. 4/42, p. 59.

85. Ibid.

86. Ibid., pp. 57-58.

exclusive right over sponge and polypi⁸⁷ fisheries had been claimed by the Bey of Tunis at least as early as 1870. In 1871, in his answer to the British Consul General in Tunis questioning the validity of this claim, Mr. Travers Twiss, the law officer, observed that:

"...there is no objection on principle to the Bey of Tunis asserting an exclusive right to the fructus of the banks off the coast of Tunis, to which sponges and polypi attach themselves, although the banks in question are at a greater distance than three miles from the coast-line, provided the Bey can show a prescriptive enjoyment of such fructus".⁸⁸

Coral fisheries were also the subjects of exclusive claims. Fulton notes that:

"Coral beds in the Mediterranean, off the coasts of Algeria, Sardinia and Sicily, are in a similar way (as pearl fisheries) regulated by Italian and French laws beyond the ordinary three mile limit".⁸⁹

Referring to coral fisheries in Algeria, Smith stated that:

"...numerous laws have also been enacted by France to protect and regulate the coral fisheries of Algeria, both as to natives and foreigners, and the coral beds so regulated extended at some points as far as 7 miles into the sea".⁹⁰

-
87. Polypi are sea anemones and are very similar to corals, see C.M. Yonge, The Sea Shore, 10th impression, 1975, p. 104.
88. International Law Opinions, Vol. I, Op. Cit., in note 65 (p. 48), pp. 258-259.
89. Thomas W. Fulton, Sovereignty of the Sea, 1911, pp. 697-698.
90. Smith, Op. Cit., in note 46 (p. 38), Vol. II, pp. 412-413.

And with regard to Italian regulations he stated:

"The coral reefs surrounding the island of Sardinia and lying off the South-West coast of Sicily, have been made the subject of elaborate regulations by the Government of Italy....remarks made as to the Algeria Coral fisheries equally apply to the Italian reefs".⁹¹

Exclusive claims over sedentary fisheries were also made by the Governments of Panama (1931),⁹² Venezuela (1935)⁹³ and Libya (1939).⁹⁴

Pearl oyster, corals, sponges, beche-de-mer and chanks were the subjects of exclusive claims by the regulations mentioned above. It is important to note that they were never used or claimed as food resource. The only exception was the oyster. Fulton notes that two conventions

91. Ibid. See also Auguste, Op. Cit., in note 17 (p. 11), pp. 52-53; UN Doc. A/C.N. 4/42, p. 59.

92. UN Doc. A/C.N. 4/42, pp. 61-62.

93. Ibid., pp. 60-61. According to Auguste:
"The Venezuelan Pearl Fisheries Act No. 19.143 of 22 July 1935 declares pearl fishing to be a national industry, to be directed and administered by the Federal Executive. The Act lays down elaborate provisions for the licensing of ships and divers, for fixing the dates of the pearling season, and for protecting the oyster beds...In some cases these areas are possibly beyond the three mile limit of territorial waters ordinarily recognised by Venezuela". Op. Cit., in note 17 (p. 11), p. 55.

94. Libya, Royal Decree No. 1402, 1939, UNLS, Laws and Regulations on the Regime of the Territorial Sea, Op. Cit., in note 91 (p. 52), pp. 526-528. See also Royal Legislative Decree No. 1764 of 12 April, 1937 to Approve the Regulations Governing Sponge-Fishing in the Waters of Libya and of the Italian Island in the Aegean, ibid., pp. 525-526.

of 1839⁹⁵ and 1867⁹⁶ between Great Britain and France:

"...dealt with oyster fisheries in a special manner, and on the coast of France a large area, extending much beyond the three mile limit, was reserved to French fishermen on account of the valuable oyster grounds it contained".⁹⁷

The Paris Convention of 1839 gave rise to an important question regarding the extensive and very productive oyster beds outside Ireland's three mile limit since the Irish authorities claimed the right to control oyster fisheries in those areas. Fulton states that:

"Accordingly, in the Act of 1843 giving effect to the Convention, a clause was inserted empowering the Board of Trade, with the sanction of the Privy Council, to suspend the operation of the Convention in Ireland or any part thereof, so long as the fisheries there should be carried on exclusively by British subjects and also to make bye-laws for enforcing the Act as soon as French boats frequented Irish waters for the purpose of fishing".⁹⁸

The Convention Act of 1863 enabled the Irish Commissioners:

"...to regulate the dredging for oysters on any oyster beds situated within a distance of twenty miles seaward...an area of nearly 1300 square geographical miles, outside the

-
95. Convention between Her Majesty and the French King, defining and regulating the limits of the Exclusive Right of the Oyster and other Fishery on the Coast of Great Britain and of France. Signed at Paris, 2 August, 1839, Fulton, Op. Cit., in note 89 (p. 54), pp. 611-614.
96. Convention between Her Majesty and the French Emperor, relative to the Fisheries in the Seas between Great Britain and France. Signed at Paris, 11 November, 1867. This Convention was not ratified. Ibid., p. 631.
97. Ibid., p. 620. Jessup notes that "By an imperial Decree of 10 May, 1862, it was announced (by France) that fishing for all crustaceous and shell fish other than oysters, is allowed during the whole year at a distance of three mile from the low water mark. A closed season for oysters was ordained. This, of

three mile limit".⁹⁹

On 29 April, 1869, by an Order in Council, regulations regarding oyster fisheries in Ireland were made. It is interesting to note that according to those regulations "no other boats than British boats were therein specified".¹⁰⁰

course, constitutes a regulation of fishing outside the three mile limit". Philip C. Jessup, The Law of Territorial Waters and Maritime Jurisdiction, 1927, p. 19.

98. 6 & 7 Vict., c. 79, s. vi, see Fulton, Op. Cit., in note 39 (p. 54), p. 620.
99. Fulton, Op. Cit., in note 89 (p. 54), p. 621. Section 67 of the 1868 Act (31 & 32 Vict., c. 45) stated: "The Irish Fishery Commissioner may from time to time lay before Her Majesty in Council Byelaws for the Purpose of restricting or regulating the dredging for Oysters on any Oyster beds or banks situate within the distance of Twenty Miles measured from a straight Line drawn from the Eastern Point of Lambay Island to Carnsore Point on the coast of Ireland, outside of the exclusive Fishery Limits of the British Islands, and all such Byelaws shall apply equally to all Boats and Persons on whom they may be binding". Cited by Marston, Op. Cit., in note 15 (p. 25), pp. 43-44. According to Marston "the above section was introduced into the Bill despite an opinion given to the Board of Trade in May 1868 by Law Officers,....., together with the Attorney-General for Ireland....The opinion stated:
- 1st. We are of opinion that the Irish Fishery Commissioners have not power to enforce close time or other restrictions on Oyster fishing on the Banks in question outside the three mile limit as against foreigners, and we think it extremely doubtful whether they have any such power against British subjects.
 2. We think that such power might be conferred by Act of Parliament as against British subjects, but not, in the absence of treaty, as against foreigners.....". Ibid., p. 44.
100. According to Marston : "In the preparation of the British argument for the Behring Sea Arbitration in 1892, the Foreign Office asked the authorities in Dublin for information on whether the Act had ever been enforced against foreign boats at a greater distance than three marine miles from the shore. The reply, dated 22 October 1892, was negative". Ibid. Fulton, Op. Cit., in note 39 (p. 54), p. 621.

ii. Exploitation of the Resources of the Subsoil

Unlike the arguments mentioned above which were raised in relation to the exclusive right of coastal states over their sedentary fisheries outside the three mile limit, claims to exclusive exploitation of the subsoil did not provoke any opposition in international law. The right of coastal states to exploit the subsoil was related primarily to the mining of coal and had the following characteristics:

(a) the exploitation of the subsoil was initially undertaken from the shore by means of tunnelling and therefore did not interfere with the freedom of the high seas.

(b) the controversial arguments about the need for effective occupation propounded by many international jurists did not apply to the subsoil since it was generally understood that its legal status was different from that of the seabed.

(c) considering the technological capabilities of the states, they could hardly exploit coal far beyond the three mile limit.

However, as early as 1858, Great Britain in the Cornwall Submarine Mines Act 1858, declared:

"All mines and minerals lying below low-water mark under the open sea adjacent to, but not being part of the County of Cornwall, are vested in Her Majesty the Queen in right of Her Crown as part of the soil and territorial possessions of the Crown".¹⁰¹

101. 21 & 22 Vict, c. 109, s. 2. Colombos notes that: "The Coal Act 1938, set up a coal commission in which all the Crown's proprietary rights in unworked coal were vested....these rights were subsequently transferred to the National Coal Board under the

Although the above Act recognised the right of the Crown over all minerals below low-water mark it did not stipulate the seaward limit of the submarine areas.¹⁰³ Furthermore, according to Cockburn C.J. the Cornwall Submarine Act was intended only to settle a dispute between the Crown and the Duchy of Cornwall and "was not authority for a general assertion that the Crown held the property in the bed of of the sea".¹⁰⁴ On July 7, 1910 in the House of Commons the Financial Secretary to the Treasury made the following statement regarding the exploitation of minerals under the sea:

"In no cases up to the present have the Commissioners of Woods, etc., granted leases beyond the three-mile limit. In all leases of under-sea mines they require the leases to leave a barrier on the seaward boundary so they cannot work beyond the three-mile limit without committing a breach of covenant for which the lease would be forfeitable".¹⁰⁵

Coal Industry Nationalisation Act 1946". C. John Colombos, The International Law of the Sea, 6th revised edition, 1967, p. 69. For the Act see 9 & 10 Geo 6, Chapter 59.

103. For full discussion on the Cornwall Submarine Mines Act 1858 see Marston, Op. Cit., in note 15 (p. 25), pp. 75-113.
104. Ibid., p. 132. The statement by Cockburn C.J. was made in R.v. Keyn: The Franconia Case (1876) 2 Ex. D. For Cockburn C.J. see *ibid.*, pp. 159-238.
105. 13 House of Commons Debates., col. 1782, cited by Marston, Op. Cit., in note 15 (p. 25), p. 175. For further details regarding the legal history of the exploitation of the seabed and subsoil in Great Britain see Marston, *ibid.*, pp. 75-113.

Apart from Great Britain, Australia, Chile, Japan, and Canada were also engaged in subsoil coal mining off their coasts.¹⁰⁶ According to Franklin:

"Other undersea mines, principally coal, which represented 19th century claims by states to subsoil resources of the continental shelves, although often not extending beyond the limit of territorial waters, were also of Australia, Canada, Chile and Japan, as well as many others in England besides the Cornwall mines. These claims were based upon the recognised right of a coastal state to occupy the subsoil under the high seas by the extension of mining installations whose entrance was located on the coastal state or in the territorial waters thereof".¹⁰⁷

We may also refer to the Petroleum Production Act of 1934 in Great Britain¹⁰⁸ by which the Crown's exclusive right to search for and exploit petroleum "in its natural condition in strata" was recognised and in 1935 the Board of Trade was empowered to issue licences covering the submarine areas off the coasts of Great Britain.¹⁰⁹ There is not, however, any evidence to suggest that the above Act was, before the emergence of the continental shelf doctrine, put into practice. Furthermore, the extent of the submarine areas claimed was not clear and therefore, it is not possible to say whether the claim extended beyond the three mile limit.

106. Z.J. Sluka, International Custom and the Continental Shelf, 1968, p. 42.

107. Loc. Cit., in note 2 (p. 4), p. 33; see also Hurst, Loc. Cit., in note 15 (p. 39), pp. 34-36.

108. 24 & 25 Geo. 5, c. 36.

109. Petroleum (Production) Rules, 1935 (S.R. and O., 1936, No. 426), see Colombos, Op. Cit., in note 102 (p. 59), p. 69.

Conclusion

According to customary international law the right of the coastal States over the submarine areas beyond the three mile limit of territorial waters was based on either occupation or prescription.¹¹⁰ There existed a distinct difference between the legal status of the seabed and that of the subsoil.¹¹¹ There is no evidence to suggest that prior to the emergence of the continental shelf doctrine the seabed of the submarine areas had been a subject of a direct claim on the basis of either occupation or prescription.¹¹²

The exclusive rights of some coastal States to pearl, chanks, oysters, sponges and beche-de-mer were, originally, based on immemorial possession and did not interfere with the customary international law of the sea by which the freedom of fishing and navigation had long been established. Claims to certain species were not claims to the seabed itself and as has been shown the designated areas for such fisheries could change according to the periodical changes of the species involved.¹¹³

Those claims and practices were few and as has been indicated considered to be part of customary international

110. See above pp. 22-44.

111. See above pp. 58-60.

112. See above pp. 45-58.

113. See above pp. 50-51.

law. Their relation to the generally accepted freedom of the seas were regarded as "an exception to the primary rule of the freedom of the seas".¹¹⁴ Those claims were concerned with the species and, therefore, they cannot be regarded as having made any contributions to the emergence of the continental shelf doctrine.

114. See above at p. 37.

CHAPTER III

The CONTINENTAL SHELF DOCTRINE

Introduction

At the beginning of this century the term 'continental shelf' was used for the first time in various claims and by different states and emerged as a new concept in international law.¹ However, as we shall see, the scope of those early claims regarding both the areas claimed and the resources concerned were very limited. On the other

-
1. Lord McNair, referring to a report by Mr. Nicholl dated 17 November, 1306, states that "The following is a valuable report made almost ex tempore, by Nicholl upon a proposal by the United States for an extension of territorial waters. Does the sixth paragraph contain the first reference to the 'continental shelf' as a legal factor?". The report read inter alia as follows:
"I have had the honour to receive your Lordship's private letter of yesterday's date...in relation to a demand urged by the American Commissioners for an Extension of their maritime jurisdiction...The demand of an Extension of Maritime Jurisdiction made by the United States cannot (in my opinion) be maintained as a matter of Right, either upon Principle or Authority; and if it be granted, it should be accepted as a concession, depending for its Bases upon corresponding concessions, and for its continuance upon that of the Treaty. The general Principle is that the High Seas are extra-territorial. There is no occupancy and possession of them, which is the basis of territorial Dominion.

.....
If this view of the Principle be correct, the grounds assigned by the American Commissioners to sustain their demand, formed no reason for extending their Jurisdiction as a matter of Right; namely, 1. The Extent of their territory. 2. Its distance from other Jurisdictions. 3. The number of Headlands. 4. The Shelving nature of its coasts". International Law Opinions, Vol. I, Op. Cit., in note 65 (p. 48), at p. 331, emphasis added.

hand, those claims had very little influence on the formation of the continental shelf doctrine. They were neither followed nor acquiesced in by other States and were soon forgotten.² Nevertheless, since they referred to the continental shelf, it is appropriate to examine their content. In this Chapter the doctrine of the continental shelf will be examined. The Chapter is divided into three Sections as follows:

- A. Emergence of the Continental Shelf Doctrine
- B. Truman Proclamation of 1945
- C. Claims Made by States Between 1945 and 1958

2. It can be argued, however, that those claims and claims of similar nature would, probably, have persisted had it not been for the sudden emergence of the continental shelf doctrine.

A- Emergence of the Continental Shelf Doctrine Before 1945

François, in his Report on the High Seas made the following statement on page 34, under the heading "The Continental Shelf":

"As early as 1916 the theory of the continental shelf made its appearance in two different places, in Spain and in Russia".³

It is, however, to be noted that even before 1916 the Government of Portugal issued a decree concerning fishing off its coasts and referred to the continental shelf.⁴ The following references were made to the continental shelf in decrees, declarations or treaties before 1945.

i. Portugal

Portugal in a decree regulating fishing by steam vessels in November 1910 made the following reference to the continental shelf:

"Whereas deep trawling by steam vessels at depths of under 100 fathoms within the limits of the continental shelf is extremely harmful to fisheries, because this method destroys the feeding grounds on the sea bed...

Whereas this has occurred on all coasts where such a system has been used, even along the vast continuous continental shelf which runs from the Bay of Biscay northwest along the coasts of France, Belgium, Holland, Germany, as far as the Norwegian coast where it turns southwest and extends to within fifty miles of the west coast of Ireland.....

3. J.P.A. François, Report on the High Seas, A/CN.4/17, 17 March, 1950. See also W.M. Mouton, The Continental Shelf, 1952, pp. 240-241.

4. UNLS, Laws and Regulations on the Regime of the High Seas, Vol. I, 1951, pp. 19-21.

Whereas our continental shelf is so narrow that eight steam vessels could cover it with their nets in one year's fishing..... Now therefore the Provisional Government of the Portuguese Republic hereby issues, in the name of the Republic, the following decree which shall have the force of law".⁵

Article 2 of the above decree stated that:

"Fishing by this method may only be carried out beyond the bathymetric of 100 fathoms, and never at a distance of less than three miles from the coast".⁶

It is clear that the above Decree did not lay any claim to the continental shelf itself and nor did it try to regulate fisheries beyond the three mile limit. However, it did evidence the coastal States' special interests in protecting their living resources in that area. The Portuguese attempt to exclude or regulate foreign steam fishing vessels from 100 fathoms depth can be regarded as the first step towards what half a century later became one of the most important and problematic doctrines of the law of the sea, i.e. the need for conservation in a functional contiguous or economic zone based on coastal States'

5. Ibid., pp. 19-20.

6. Ibid., p. 20. Portugal and Spain in a joint proclamation tried to regulate fisheries beyond their three mile territorial waters but met with strong opposition by Great Britain. According to Fulton "Communications were made to the Foreign Office on the subject of Spanish and Portuguese territorial Limits, and, in reply, the Association was informed that His Majesty's Government did not recognise any claims of the Spanish or Portuguese Governments to exercise jurisdiction over British vessels beyond the three mile limit". Fulton, Op. Cit., in note 89 (p. 54), p. 667; Jessup, Op. Cit., in note 97 (p. 57), p. 41.

special interests in the biological productivity of the sea adjacent to their territorial sea.⁷

ii. Spain

In Spain in 1916, the National Fishery Congress held at Madrid adopted a more vigorous policy than that of the Portuguese Government. It was urged in the Fishery Congress that Spain should extend its territorial waters in order to include the whole continental shelf for the purpose of conserving the off-shore fisheries.⁸ However, no measures were taken by the Spanish Government to give effect to the above proposal since it would involve the exclusion of foreign fishermen in a vast area beyond the three mile limit regarded as the high seas. It is interesting to note that the Congress' proposal was based on the extension of the territorial sea and related the fishery to the continental shelf. No doubt the object was to exercise sovereignty within the limit of the continental shelf. Moreover, both Spain and Portugal were in favour of asserting rights over the continental shelf for the purpose of

-
7. The special interest of coastal States in their fisheries and other natural resources beyond the three-mile limit of the territorial sea was also raised during the Hague Conference for Codification of International Law in 1930. See, for example, the statement made by the Colombian Delegation to the Plenary Committee. League of Nations, Minutes of the Second Committee - Conference for the Codification of International Law, The Hague 1930 (Territorial Waters) C. 351 (b) M. 145 (b) 1930, V., pp. 182-183 and *ibid*, p.150.
8. Douglas M. Johnston, The International Law of Fisheries, 1965, p. 227.

fishing. This policy was later adopted by some coastal States, in particular Latin American States.⁹

iii. Russia

In September, 1916, the Imperial Government of Russia issued a Proclamation in which it claimed that certain islands off the Asian coast, north of Siberia, formed an integral part of Russia.¹⁰ This claim which was confirmed by the Government of the Union of Soviet Socialist Republics in a memorandum dated 4 November, 1924, is believed to be the first diplomatic statement referring to the continental shelf.¹¹ Although it is clear that this proclamation did not directly refer to the submarine areas and referred only to the islands which were situated on the Asian continental platform off the Russian coasts, there is an indication that the criterion on which this claim was based was the contiguity of the submerged land on which these islands were located.¹²

9. See below C "Claims Made by States Between 1945 and 1958".

10. The claim stated that "Henrietta, Jeannete, Benett, Herald and Uyedineniya Islands which, together with new Siberia, Wrangel and other islands situated close to the Asiatic shore of the Empire form a northward extension of the continental platform of Siberia". The Text of Russia's claim is given by V.L. Lakhtine, Rights over the Arctic Region, Moscow, 1928, cited by Auguste, Op. Cit., in note 17 (p. 11), p. 58; Mouton, Op. Cit., in note 3 (p. 65), p. 240.

11. Mouton, Op. Cit., in note 3 (p. 65), pp. 240-241, Auguste, Op. Cit., in note 17 (p. 11), p. 58, Johnston, Op. Cit., in note 8 (p. 67), p. 227.

12. Auguste notes that "The fact that this is not actually mentioned does not detract from the indirect claim for, though the claim establishes the right over exterior land, i.e., land above the sea as being Part of Russian territory, by relating it to continental contiguity,

Whether or not contiguity was, at the time, a good ground on which to base a claim to sovereignty was somewhat doubtful. In the Island of Palmas Case, the Arbitrator said that:

"The title of contiguity understood as a basis of territorial sovereignty, has no foundation in international law".¹³

Professor Lauterpacht, on the other hand, discussed the question of title by contiguity and observed:

"To say that the principle of continuity- or contiguity- has no place in international law is to state a proposition of doubtful accuracy. The principle of contiguity played a useful part in the period when some compromise between the fanciful assertions of pure discovery and effective occupation best fulfilled the needs of the time".¹⁴

He then noted that:

"...while the doctrine and the fact of contiguity provide the natural foundation for the principle that the adjacent submarine areas belong to the littoral state, that principle may receive a substantial accession of strength from the view that the relation is one not only of contiguity and proximity, but also of physical identity".¹⁵

the land creating the appurtenance, i.e, the continental shelf could be regarded as automatically claimed". Op. Cit., in note 17 (p. 11), p. 53

13. Island of Palmas Case (1928), Op. Cit., in note 7 (p. 22), p. 369.

14. Lauterpacht, Loc. Cit., in note 19 (p. 27), p. 425.

15. Ibid., p. 480. Mr. François referred to the Russian claim of 1916 and stated: "The rights claimed by the Soviet Union in Polar waters should be considered in relation to the 'theory of sector'. The Soviet Government has not submitted any claims on the basis of the 'continental shelf' theory nor has it replied to the claims of other States". See UN. Doc. A/CN4/17 (1950), p. 34.

iv. Treaty of the Gulf of Paria

The most important document concerning the continental shelf, before the Truman Proclamation, was the 1942 United Kingdom-Venezuela "Treaty of the Gulf of Paria".¹⁶

Geographically, the Gulf of Paria is a relatively narrow expanse of sea which separates Venezuela and Trinidad. In 1940 it was discovered that there was a promising field of oil in the submarine area of the Gulf and as a result the Treaty of the Gulf of Paria was signed between the United Kingdom and Venezuela in 1942.¹⁷ The Treaty intended to allow orderly exploration for petroleum and its exploitation on the submarine areas of the Gulf. This Treaty divided the submarine area of the Gulf of Paria between the contracting parties and was, essentially, a bilateral agreement binding upon the two parties.

Article 1, and Article 2 (2) and 2 (3) required that neither party would claim the submarine area belonging to the other party. The Treaty did not attract any attention at the time although some of its provisions were new and quite important. First, it referred to the mineral resources of the submarine areas while recognising the freedom of the high seas. Thus, the status of the superjacent

16. UNLS, Laws and Regulations on the Regime of the High Seas, Vol. 1. Op. Cit., in note 4 (p. 65), pp. 44-47.

17. Trinidad and Tobago, former British Colony from 1814 until 1962 when it became an independent State within the Commonwealth. The Treaty of the Gulf of Paria was not repudiated by the Government of Trinidad and Tobago after it gained its independence.

waters remained in accordance with the customary international law regarding the freedom of the high seas.¹⁸ Secondly, some conditions for safe navigation were provided with regard to permanent installations (to be built) on the submarine areas.¹⁹ Finally, the Treaty introduced some measures concerning the prevention of oil pollution.²⁰ However, the Treaty did not make any provisions regarding sedentary fisheries in the Gulf of Paria whose submarine areas were divided between the contracting parties.

18. Articles 6 and 8 of the Treaty Relating to the Submarine Areas of the Gulf of Paria, 26 February, 1942, UNLS, Laws and Regulations on the Regime of the High Seas, Vol. 1, Op. Cit., in note 4 (p. 65), pp. 45-46.

19. Ibid., Articles 5-8.

20. Ibid., Articles 7 and 8.

B. The United States Proclamation of 1945

On 28 September, 1945 President Truman issued a Proclamation concerning the continental shelf of the United States.²¹ This Proclamation referred to the natural resources of the seabed and subsoil of the continental shelf beneath the high seas, but contiguous to the coasts of the United States as appertaining to the United States and, therefore, subject to its jurisdiction and control.

It is perhaps necessary to examine the conditions leading to the announcement of the Proclamation by the United States, in order to analyse in the light of the background to the Proclamation its legal status and its subsequent effects on the formation of the continental shelf doctrine.

i. Background to the Proclamation

As early as 1918 there appeared an enquiry by an American citizen to the State Department regarding the exploitation of oil in the Gulf of Mexico, some 40 miles from the shore in an area where the depth of superjacent waters was less than 100 feet.²² The State Department replied that:

"...the United States has no jurisdiction over the ocean bottom of the Gulf of Mexico beyond the territorial waters adjacent to the coast. Therefore, it does not appear

21. Presidential Proclamation no. 2667, Text in 10 Federal Register 12033, Department of State Bulletin 485 (1945), UNLS, Laws and Regulations on the Regime of the High Seas, Vol. I, 1951, pp. 38-39.

22. Green Haywood Hackworth, Digest of International Law, Vol. II, 1941, pp. 679-680.

possible for the United States to grant to you the leasehold or other property rights in the ocean bottom which you desire".²³

Although there was no indication of the United States' having any right over the submarine areas of the Gulf of Mexico in that letter it was noted that if an artificial island were erected in that area by an American citizen for the purpose of the exploitation of petroleum, the State Department possibly "would assume some sort of control over the island".²⁴

In 1935 there was another incident revealing more positively the attitude of the United States toward the continental shelf. This time it concerned the fishing of salmon off the coasts of Alaska which had been seriously threatened by Japanese fishermen. As a result, and in order to protect the coastal fishery off Alaska, the Copeland Bill was passed by the Senate.²⁵ Section 3744 of the Bill purported to extend United States jurisdiction over the

23. Ibid. It was further stated in that reply that: "The Department further informs you that, unless the erection of an artificial island interfered with rights of the United States or of its citizens, or formed the subject of a complaint made upon apparently good grounds, by a foreign government, it is not likely that this Government would object to the erection by American citizens of such an island as you suggest. The Department is not in a position to procure information from other nations as to their attitude toward such a project, but it would seem that no foreign government would interfere with the erection of an artificial island in the Gulf of Mexico unless its interests or the rights of its citizens were injuriously affected thereby". Ibid., p. 680.

24. Ibid.

25. Larry L. Leonard, International Regulation of Fisheries, 1944, p. 134; see also Marjorie M. Whiteman, Digest of International Law, Vol. 4, 1965, pp. 945-954.

fishing resources of the shelf and stated that it included:

"...all the waters and submerged land adjacent to the coast of Alaska...lying within the limits of the continental shelf having a depth of water of 100 fathoms, more or less".²⁶

The Copeland Bill did not go any further than the Senate, but it shows that some pressure existed regarding the regulation of the fisheries within the continental shelf limit.

In 1944, again the question of the exploitation of the continental shelf was raised by another American.²⁷

This time the Department of State replied that:

"The Department does not concur in your position. It does not consider that private individuals or concerns could acquire for themselves dominion over lands beneath the High Seas".²⁸

It is clear from the above statement that the State Department did not go as far as declaring that the United States Government had no right to grant to its citizens any ownership rights regarding the submarine areas beyond

26. Leonard, Op. Cit., in note 25 (p. 73), p. 134.

27. Whiteman, Op. Cit., in note 25 (p. 73), pp. 740-741.

28. Ibid. In 1932 Gidel, referring to artificial islands, stated that: "Their establishment (installations more or less fixed for purposes other than fishing occupy a certain amount of the High Seas other than the subsoil seabed) ought to be subject to agreement, express or tacit, of all States", Le Droit International Public De La Mer, 1932, p. 502, cited by Whiteman, Op. Cit., in note 25 (p. 73), p. 741.

the three miles limit.²⁹

However, as far as the exploitation of the petroleum of the submarine areas of the United States was concerned several states including California, Texas and Louisiana wanted to act independently of the Federal Government to proceed to regulate the exploitation of petroleum off their shores and were prepared to do so. The problem for the Federal Government was, therefore, twofold; first, to ascertain the legal status of the coastal States' rights over the resources of the continental shelf which had not yet been discussed in international law and secondly, to solve the domestic problem i.e., whether the Federal Government had an overall right over the resources of the continental shelf of the United States or whether every state could act individually and independently. The controversy between the Federal Government and individual states, as well as the country's need for new oil fields (taking

29. The actual drilling for oil on the continental shelf of the United States goes as far back as 1938 when there was a joint operation by the Superior Oil Company and the Pure Oil Company on the Gulf of Mexico in a distance of 6,000 feet from the shore. See I.W. Alcorn, "The Pure Oil Company's Tideland Development", 129 (No. 1) World Oil, May, 1949, p. 115. Well drilling was also tested in the submarine areas off Texas and Louisiana in 1938, James S. Critz, "Oil Possibilities on the Gulf Coast Continental Shelf", 124 (No. 6) The Oil Weekly, 6 January, 1947, p. 21; R.O. Shrewsbury, "Deep Sea Drilling", 120, The Oil Weekly, 10 December, 1945, p. 36; W.O. Noland and Ray M. Huffington, "Development and Outlook for the Continental Shelf of Texas and Louisiana", 1 (No. 5), Offshore Operations, January, 1955, p. 9; "The Operation by Magnolia Company off Louisiana" in Report published in 124 (No. 4), The Oil Weekly, 23 December, 1946, p. 27, cited by Sluka, Op. Cit., in note 106 (p. 60), pp. 76-77.

account of the financial and technological capabilities of the United States to exploit them), were the main reasons behind the 1945 Truman Proclamation.³⁰ As noted by Freeman:

"Truman's Proclamation had legal consequences both domestically and internationally. Domestically, they settled the controversy between the Federal Government and various coastal states governments which claimed sovereignty over the areas beyond their coastlines".³¹

The first paragraph of the Truman Proclamation reflected these activities when it stated:

"Whereas the Government of the United States of America, aware of the long range world-wide need for new sources of petroleum and other minerals, holds the view that efforts to discover and make available new supplies of these resources should be encouraged".³²

In the first paragraph the Proclamation also stated that:

"...the Government of the United States regards the natural resources of the subloil and seabed of the continental shelf beneath the high seas, but contiguous to the coasts of the United States, subject to its jurisdiction and control".³³

Since this Proclamation was not challenged by other States

-
30. See Wilbert M. Chapman in L.M. Alexander (ed), *The Law of the Sea, Proceedings of the Third Annual Conference of the Law of the Sea Institute* (June 24-27, 1968), p. 35 et seq.
31. H.A. Freeman, "Law of the Continental Shelf and Ocean Resources - An Overview", 3-5 *Cornell International Law Journal*, 1970-1972, p. 112. For further detail on the background to the US Proclamation, see Whiteman, *Op. Cit.*, in note 25 (p. 73), pp. 752-756.
32. Presidential Proclamation No. 2667, *Op. Cit.*, in note 21 (p. 72).
33. *Ibid.*

on the one hand, and was followed by many coastal States on the other, it gave rise to the creation of the continental shelf doctrine.³⁴ It also gave rise to the settlement of the dispute between the Federal Government and state governments and the United States Supreme Court held that the Federal Government had an exclusive right to the resources of the continental shelf as defined in the Proclamation.³⁵

It is important to note that the main purpose behind the Truman Proclamation was related to the exploitation of petroleum. As was clearly stated by Kunz:

34. In 1969 the International Court of Justice, in the North Sea Continental Shelf Cases, while referring to the continental shelf as the 'natural prolongation' of the land territory under the sea, sought to establish its origin in the Truman' Proclamation of 1945. The Court observed that:
"Although this instrument was not the first or only one to have appeared, it has in the opinion of the Court a special status. Previously, various theories as to the nature and extent of the rights relative to or exercisable over the continental shelf had been advanced by jurists, publicists and technicians. The Truman Proclamation however, soon came to be regarded as the starting point of the positive law on the subject, and the chief doctrine it enunciated, namely that of the coastal State as having an original, natural, and exclusive (in short a vested) right to the continental shelf off its shores, came to prevail over all others, being now reflected in Article 2 of the 1958 Geneva Convention on the Continental Shelf". North Sea Continental Shelf, Judgment, ICJ. Report, 1969, pp. 32-33. For analysis of the Court's Judgment on this point see, E.D. Brown, "The North Sea Continental Shelf Shelf Cases", 23 Current Legal Problems (1970), pp. 187-215, at pp. 189-191, see also below Chapter IX (C) "The 1969 Continental Shelf Cases".

35. See US v California, 332 US 19 (1947); US v Texas, 339 US 707 (1950); US v Louisiana, 339 US 699 (1950). For detail of the Supreme Court rulings see Whiteman, Op. Cit., in note 25 (p. 73), pp. 764-789.

"The doctrine of the continental shelf is the outcome of the fact that petroleum is highly needed, that geologists have located great resources of petroleum below the waters of the continental shelf and that engineering progress has made possible the extraction of this oil".³⁶

ii. The Scope of the Proclamation in Terms of the Resources

At the time the Proclamation was issued it was mainly the exploitation of petroleum and, to some extent, the exploitation of some minerals which occupied the minds of those considering the question of the natural resources of the continental shelf.³⁷ Although this intention, as has already been discussed, was expressly referred to in the first paragraph of the Proclamation, the term 'natural resources' and not 'mineral resources' was repeatedly used throughout the Proclamation. The difference between the terms 'mineral resources' and 'natural resources' is significant and can create serious problems since, whilst the meaning of the former is clear, the latter is obscure and vague. The term natural resources and the legal difficulties which might arise as a result of its ambiguity remain

36. Joseph L. Kunz, "Continental Shelf and International Law: Confusion and Abuse", 50 AJIL (1956) pp. 828-853, at p. 829.

37. See Ickes, the Secretary of the Interior, Annual Report, 1945, pp. VII- X ; see also Kunz, Loc. Cit., in note 36 (p. 78), pp. 828-829, Edwin Borchard, "Resources of the Continental Shelf", 40 AJIL (1946) pp. 53-70, at pp. 53-57, Garcia Amador, The Exploitation and Conservation of the Resources of the Sea, 1959, p. 89, Sluka, Op. Cit., in note 106 (p. 60), at pp. 76-80.

until such time as the term is clearly defined.³⁸ Vallat, shortly after the Proclamation was issued, criticised the use of the term 'natural resources' as follows:

"It is difficult to see what distinction there is between control over the 'natural resources' and control over the subsoil and seabed themselves. Anything of value might be included in 'natural resources' and any use or interference with the subsoil or seabed might equally be regarded as a use or interference with their 'natural resources' ".³⁹

It was contended that the Proclamation recognised the customary international law with regard to the freedom of the high seas by stating that:

"The character as high seas of the waters above the continental shelf and the right to their free and unimpeded navigation are in no way thus affected".

The wording of the last sentence of the last paragraph is not as clear as it at first seems to be. The freedom of the high seas in customary international law comprises the freedom of navigation, fishing, laying of submarine cables and pipelines and the right to fly over it, but there is

38. The argument regarding the difference between 'natural' and 'mineral' resources dominated various meetings of the ILC in 1951, 1953 and 1956, see below Chapter IV. The use of the term 'natural resources' by the ILC and its adoption by the 1958 Geneva Convention on the Continental Shelf resulted in a wide interpretations by some coastal States and gave rise to some disputes. See below Chapter VIII (B) " Disputes Concerning the Definition of Natural Resources in the 1958 Geneva Convention on the Continental Shelf". The problem concerned the inclusion of the living resources of the superjacent waters of the continental shelf within the definition of 'natural resources'. This problem gradually lost ground as the doctrine of the Exclusive Economic Zone and Fishery Zone became widely accepted. See below Chapters IX and X.

39. F.A. Vallat, "The Continental Shelf", 23 BYIL (1946) pp. 333-338, at p. 333.

no explicit mention of the freedom of fishing and laying submarine cables and pipelines in the Proclamation.⁴⁰

-
40. It is important to note that since 1937 the question of jurisdiction over the continental shelf of the United States was closely related to both minerals and fisheries. In his letter of 21 November 1937 to Counsellor of the Department of State, President Roosevelt noted that:
- "I wish you would talk with the Secretary [Hull] and tell him I suggest that you proceed immediately to the study of the possibility of adopting a new policy relating to offshore fishing of Alaska....It occurs to me that a Presidential Proclamation closing the sea area along the Alaska coast to all fishing - Japanese, Canadian and American - might be a way out". President Roosevelt to R. Walton Moore, Counsellor, Department of State, Memorandum, Nov. 21, 1937, MS Dep. of State, File 711.008 North Pacific/264, Whiteman, Op. Cit., in note 25 (p. 73), at p. 945. The outbreak of War halted the further progress until June 5, 1943 when Harold L. Ickes, Secretary of the Interior sent a communication to President Roosevelt. It read inter alia:
- "The continental shelf extending some 100 or 150 miles from our shores forms a fine breeding place for fish of all kinds; it is an excellent hiding place for submarines, and since it is a continuation of our continent, it probably contains oil and other resources similar to those found in our states. I suggest the advisability of laying the ground work now for availing ourselves fully of the riches in this submerged land and in the waters over them". MS Department of State, File 811.0145/367, Whiteman, Op. Cit., in note 25 (p. 73), at pp. 946-947. On March 8, 1944, the Assistant Secretary of State in charge of Fisheries wrote to Mr. Green H. Hackworth who was then the Legal Advisor of the Department on the subject of offshore fisheries and said inter alia:
- "The whole issue might be forced by an insistence on the part of the fisheries people that jurisdiction be extended past the three mile limit. As you know, I have been an advocate of such an extension though I realize the international complications which are immediately presented. It seemed to me that you were on the right track in developing the thought for an extension of jurisdiction as to submarine soil and fisheries rights but without interfering with the right of navigation". Assistant Secretary Long to Legal Advisor Hackworth, memorandum, 8 March, 1944, MS. Department of State, File 811 Alaska 628/45½, Whiteman, Op. Cit., in note 25 (p. 73), p. 948. On 28 September,

This is not, however, to suggest that the Proclamation necessarily laid any claim to the living resources of the continental shelf of the United States at the time it was issued, but it is open to argument that the use of the term 'natural resources' instead of 'mineral resources' was, to some extent, intentional. In fact, this proved to be the case as the United States Regulations of 1964, 1968, 1971 and 1974 referred to some species of molluscs and crustacea and considered them as the natural resources of the continental shelf.⁴¹

Finally, since the Proclamation referred to the exploitation of the natural resources of the seabed and subsoil, it was obvious that the right to extract minerals from the sea water in that area was specifically excluded. In 1969 the total value of the production of some dissolved minerals from seawater was 412 million dollars.⁴²

1945, President Truman issued a Proclamation entitled, "Policy of the United States with Respect to Coastal Fisheries in Certain Areas of the High Seas". Proclamation no. 2668, 28 September, 1945, 10 Fed. Reg. 12304. For some analysis of the Fisheries Proclamation see Whiteman, Op. Cit., in note 25 (p. 73), pp. 945-962; C.B. Selak, "Recent Developments in the High Seas Fisheries Jurisdiction under the Presidential Proclamation of 1945", 44 AJIL (1950) pp. 670-672; Edward W. Allen, "The Fishery Proclamation of 1945", 45 AJIL (1951) pp.

41. See below Chapter V (C) and (D). See also below Chapter VIII (B).
42. Marine Science Affairs, Selecting Priority Programmes, Annual Reports of the President to the Congress on Marine Resources and Engineering Development, US Government Printing Office, April 1970; UN Doc. E/4973 of April 26, 1971, Evan Luard, The Control of the Sea-bed, 1974, pp. 11-13. See also below Chapter VI (A) "Seawater as a Resource".

iii. The Scope of the Proclamation in terms of the Submarine Areas and the Rights Claimed

The fourth paragraph of the Proclamation stated:

"Whereas it is the view of the Government of the United States that the exercise of jurisdiction over the natural resources of the subsoil and sea bed of the continental shelf by the contiguous nation is reasonable and just, since the effectiveness of measures to utilize or conserve these resources would be contingent upon cooperation and protection from the shore, since the continental shelf may be regarded as extension of the land-mass of the coastal nation and thus naturally appurtenant to it....".⁴³

The above paragraph referred to the natural resources of the continental shelf but it made no attempt to draw a line to the establishment of coastal States' jurisdiction over these resources. In other words, the Proclamation did not make it clear at what depth or distance the natural resources of the contiguous submarine areas would remain under the United States' jurisdiction and control. It is, however, quite clear that the above paragraph referred to a geological definition of the continental shelf and since the depth and the width of the shelf varies, no precise figure was given in the Proclamation. On the other hand, some geological measures did appear in a White House Press Release issued on the same day as Commentary to the Proclamation.⁴⁴ It stated inter alia:

43. Presidential Proclamation 2667, 23 September, 1945, Op. Cit., in note 21 (p. 72).

44. 13 Bulletin, State Department, No. 327, 30 September, 1945, pp. 484-485, see also Whiteman, Op. Cit., in note 25 (p. 73), pp. 757-758.

"The Policy proclaimed by the President in regard to the jurisdiction over the continental shelf does not touch upon the question of Federal versus state control. It is concerned solely with establishing the jurisdiction of the United States from an international standpoint. It will, however, make possible the orderly development of an underwater area 750,000 square miles in extent. Generally submerged land which is contiguous to the continent and which is covered by no more than 100 fathoms (600 feet) of water is considered as the continental shelf".⁴⁵

The last paragraph of the Proclamation regarded the continental shelf of the United States as "appertaining" to it and "subject to its jurisdiction and control". This raises two questions: first, why was such an important claim issued through a Presidential Proclamation; secondly, what is the legal meaning of 'jurisdiction and control'?

Professor Lauterpacht discussed the above two questions and came to the following conclusions:

"It would seem not only that the assumption of 'control and jurisdiction' was preferred to assumption of 'sovereignty', but also that the 'control and jurisdiction' thus claimed had reference not to the sea-bed and subsoil of the continental shelf as such but merely to the resources of the continental shelf. That nuance of language was, it appears, intentional. It may have been due, in the first instance, to the fact that according to the constitution of the United States, formal annexation or acquisition of territory requires legislative approval and cannot be accomplished by Presidential Proclamation. Secondly, in view of the persistent attitude of the United States in the matter of acqui-

45. Whiteman, Op. Cit., in note 25 (p. 73), p. 758. It must be emphasised, however, that the 100 fathoms mentioned in the Bulletin was an estimation based on the general understanding of the average depth of the continental shelf. It did not and could not set a precise limit to the extent of the United States continental shelf. See above pp. 3-7.

sition of sovereignty over Arctic and Antarctic regions - an attitude based on a rigid insistence on effective occupation as a condition of acquisition of a valid title - it was deemed preferable to give a somewhat different and less emphatic formulation to a claim based on the fact of contiguity".⁴⁶

He then went on to say that:

"...such caution was probably unnecessary seeing that the situations are hardly comparable. However that may be, that attachment to consistency may explain not only the reluctance to adopt the terminology of sovereignty but also the decision to assert the claim by means of a Presidential Proclamation. Finally, it is possible that some importance was attached to the theory that 'sovereignty and ownership go together' and that in the view of domestic controversies in the United States concerning the ownership of the subsoil of the continental shelf the express assumption of sovereignty was deemed to be prejudicial to an as yet unresolved issue".⁴⁷

Professor Lauterpacht, while elaborating on the meaning of 'exclusive jurisdiction and control' stated that "...exclusive jurisdiction and control is sovereignty".⁴⁸ Many other distinguished jurists were also of the same opinion.⁴⁹ While it is true to say that jurisdiction and control is an integral part of sovereignty and, therefore,

46. Lauterpacht, Loc. Cit., in note 19 (p. 27), at p. 388.

47. Ibid., pp. 388-389. For the legal status of unilateral declarations in international law see below Chapter VII

48. Lauterpacht, Loc. Cit., in note 19 (p. 27), at p. 389.

49. Sir Cecil Hurst, "The Continental Shelf", 34 Grotius Society Transactions (1949), p. 160; Vallat, Loc. Cit., in note 39 (p. 79), at p. 336; Mouton, Op. Cit., in note 3 (p. 65), p. 278; Brierly, UN Doc. A/CN.4/SR.68 (1950) p. 8; C.H.M. Waldock, "The Legal Basis of Claims to the Continental Shelf", 36 Grotius Society Transactions (1950) p. 128.

sovereignty without the exercise of jurisdiction and control does not exist; it is not true to say that jurisdiction and control has the same meaning and legal effects as sovereignty.⁵⁰ It is quite clear that the Proclamation deliberately avoided the use of the term 'sovereignty'. Furthermore, the Proclamation did not claim the subsoil and seabed of the continental shelf, but only referred to the natural resources. In fact, the State Department in its Bulletin made sure that there would be no misunderstanding when it stated:

"The territorial limits of the United States are precisely the same as before September 28, 1945, namely three miles seaward from the coast".⁵¹

According to Richard Young:

"President Truman's Proclamation of 1945 made no claim on behalf of the United States to 'sovereignty', 'title', or 'ownership' of the continental shelf".⁵²

It is, however, doubtful that the United States, by virtue of jurisdiction and control, could prevent, for instance, the freedom of scientific research within its continental shelf.⁵³

-
50. The concept of sovereignty in the philosophy of law began with the detachment of law from its religious foundation. Jean Bodin in his book De Republica Libri Sex, (1576) stated: "Sovereignty is the absolute and perpetual power of a republic" and defined a republic as "a government based on the laws of nature". See Carl Joachim Friedrich, The Philosophy of Law in Historical Perspective, 2nd edition, 1973, pp. 57-66.
51. 13 Department of State Bulletin, in note 44 (p.32) p. 484.
52. Richard Young, "Recent Development with Respect to the Continental Shelf", 42 AJIL (1948) pp. 849-857, at pp. 849-850.
53. For further discussion on this point see below (C) "Claims made by States Between 1945 and 1958" and see also below Chapter IV.

C. Claims Made by States Between 1945 and 1958

Introduction

Although the United States Proclamation regarding the natural resources of the continental shelf was designed to keep the new rights compatible with the freedom of the high seas, the same policy was not followed by all States, some of which claimed sovereignty over the continental shelf and its superjacent waters.

The doctrine of the continental shelf, as formulated in President Truman's Proclamation, did not come into conflict with other international rules or customs recognising the rights of other States to enjoy the freedom of the high seas. The only legal problem discussed by some jurists was whether the right claimed by the United States could be approved and recognised in international law.⁵⁴ Although the doctrine in its introductory stage did not violate any of the established rules or customs of international law, most jurists expressed concern over the outcome of the doctrine as expressed through unilateral declarations and the possibility of excessive claims which would create conflicts and would endanger the freedom of the high seas.

The doctrine clearly provided two conditions precedent to vesting any right in the coastal States: first, the

54. See Sluka, *Op. Cit.*, in note 106 (p. 60), pp. 20-23; see also below Chapter VII "Legal Status of Unilateral Declarations in International Law".

the submarine areas were regarded as extension of the land territory under seawater;⁵⁵ and second, coastal States' jurisdiction and control were subject to the purposes of exploration of the seabed and subsoil and the exploitation of their natural resources. In other words not only did the legal status of the superjacent waters of the continental shelf remain that of high seas, open to the customary uses by all States, but the rights to be exercised by coastal States were neither unconditional nor absolute.⁵⁶

By 1958 more than 30 coastal States had laid claims to the continental shelf and, as will be shown, in some claims the doctrine as formulated by the United States was abused and misinterpreted. These variations were due to two special factors: a- fisheries; b- the characteristics of adjacent submarine areas.

(a) fisheries: In general, as mentioned earlier, biological productivity in the superjacent waters of the continental shelf is very high and for many coastal States whose fishing industry is a major means of livelihood, the exclusion of other nations from fishing in those areas had been of great concern for some time. The sudden techno-

55. But this was not the only or the most important reason behind the United States Proclamation. For further discussion on this point see below Chapter IX (C) "The 1969 Continental Shelf Cases".

56. They were conditional because they referred to the exploitation of the natural resources of the continental shelf and not to the seabed and subsoil, and they were not absolute because they were 'jurisdiction and control' and not sovereignty.

logical progress during and after World War II which facilitated the development and maintenance of distant water fleets in those highly productive areas, together with the great increase in the total catch, have created a strong argument against unconditional freedom of fishing in the superjacent waters of the continental shelf.⁵⁷ Thus certain claims to the continental shelf were extended to include fisheries in its superjacent waters.

(b) the characteristics of adjacent submarine areas: It was stated earlier that the continental shelf is the continuation of the land mass from the shore outward until it slopes off abruptly into a greater depth.⁵⁸ The average width of the continental shelf is about 30 miles but this figure can vary from zero to almost 800 miles.⁵⁹ Thus coastal States without any or with only very narrow continental shelf claimed sovereignty, or rights equivalent to it, over the submarine areas adjacent to their coasts regardless of their depth or width.⁶⁰

There is no doubt that both claims asserting national sovereignty over the submarine areas which are not continental shelf proper and those seeking to protect and

57. In 1948 the world total catch of marine fish and other products was 18.0 (millions of Metric tonnes). In 1958 the figure rose to 29.1 (m.m.t.). By 1968 the total catch was 56.5 (m.m.t.). C.P. Idyll, The Sea Against Hunger, 1978, p. 13.

58. See above Chapter I (A) "Geological Definition of the Continental Shelf".

59. Ibid.

60. See in this Section under (i), (ii) and (iii).

control fisheries beyond the limit of the territorial sea by excluding other States from their customary and internationally established rights in the high seas were beyond the scope of the doctrine of the continental shelf as formulated in 1945.

In this Section claims regarding the continental shelf and its natural resources made by various States between 1945 and 1958 will be examined. These claims have been divided into three groups as follows:

- (i). Claims to Submarine Areas with a Precise Depth Limit or to the Continental Shelf in its Geological Sense.
- (ii). Claims to the Submarine Areas with a Precise Width Limit.
- (iii). Claims to Submarine Areas without any Definite Limit.

i. Claims to Submarine Areas with a Precise Depth Limit or to the Continental Shelf in its Geological Sense

By 1958 seven States had laid claims to the continental shelf in its geological concept.⁶¹ They were Mexico, Pakistan, Nicaragua, Ecuador, Guatemala, Iceland and Colombia. It will be shown that some of these States changed their policies and in subsequent declarations abandoned the idea of a precise depth limit.

1. Mexico - In its Presidential Proclamation of 29 October 1945 Mexico considered the continental shelf of Mexico to be an integral part of the Mexican territory and thus subject to its jurisdiction and control. Paragraph two of the Proclamation stated:

"It is well known that the land forming the continental Plateaux does not rise in steep gradients from the great depths of the ocean floor but rests on a submarine platform known as the continental shelf which is bounded by the 'isobath', that is, the line joining points at the same depth (200 metres) and beyond whose limits the slope descends steeply or gradually.....: this shelf clearly forms an integral part of the continental countries and it is not wise, prudent or possible for Mexico to renounce jurisdiction and control over and utilization of that part of the shelf which adjoins its territory in both oceans".⁶²

61. After the introduction of the exploitability criterion by the ILC in 1951, coastal States avoided the use of a fixed boundary and instead employed the exploitability criterion. See UN Doc. A/1858, 17 (1951), see also below Chapter IV.

62. UNLS, Laws and Regulations on the Regime of the High Seas, Vol. I, 1951, pp. 13-14.

Paragraphs Four and Five of the above Proclamation referred to the importance of the fisheries in the waters above the continental shelf and stated that:

"...although they should of course contribute to international well being, must belong above all to the country possessing them and to the continent of which it forms part".⁶³

The Proclamation went on to state that:

"...the Government of the Republic lays claim to the whole of the continental platform or shelf adjoining its coast line and to each and all of the natural resources existing there, whether known or unknown, and is taking steps to supervise, utilize and control the closed fishing zones necessary for the conservation of this source of well being. The foregoing Paragraph does not mean that the Mexican Government seeks to disregard the lawful rights of third parties, based on reciprocity, or that the rights of free navigation on the high seas are affected, as the sole purpose is to conserve these resources for the well-being of the nation, the continent and the world".⁶⁴

It is apparent that the Mexican claim combined two purposes in the one declaration viz (I) the right of control and jurisdiction over the seabed and subsoil of the continental shelf which was regarded as being absolute and indisputable, and (II) a presumption of the prior Mexican interests in the fishing resources of the waters covering the continental shelf. It is also important to note that the only unconditional right of other States in the area claimed was that of free navigation and although Mexico did not directly claim an exclusive right of fishing in

63. Ibid., p. 13.

64. Ibid., p. 14.

the superjacent waters of the continental shelf the declaration of "taking steps to supervise, utilize and control the coastal fishing zones" was a move in that direction. Furthermore , there was no mention of the freedom of other States to lay submarine cables or engage in scientific research within the continental shelf of Mexico.

2. Pakistan - The Proclamation issued by the Governor-General of Pakistan on 9 March 1950 stated that "...the seabed along the coasts of Pakistan extending to the one hundred fathoms contour into the open sea shall, with effect from the date of this declaration, be included in the territories of Pakistan".⁶⁵

Perhaps the only merit of this Proclamation lies in the precise seaward limit of the submarine area claimed i.e. the 100 fathoms contour. Otherwise in considering the seabed as part of her territory, Pakistan claimed an absolute sovereignty. No mention was made in the Proclamation of the superjacent waters of the submarine area and the right of other States to free navigation and fishing. Sovereignty over the submarine area could, however, potentially exclude other rights such as the right to lay submarine cables or to carry out scientific research.

3. Nicaragua - Nicaragua's claim to the continental shelf first appeared in its Constitution in 1948 and then

65. UNLS, Laws and Regulations on the Regime of the High Seas, Vol. I, 1951, p. 303. Note that both Mexico and Pakistan claimed the seabed and subsoil of the continental shelf and not, as was the case in the United States claim, the natural resources of the seabed and subsoil of the continental shelf.

was approved by the Congress in May 1949.⁶⁶

Article 2 of the 1948 Constitution regarded the continental shelf as part of national territory and the Declaration of 1949 approved by the Congress stated that:

"...the continental shelf, referred to in Art 2 of the Constitution as an integral part of Nicaraguan territory, is that part of the land covered by marine waters to a depth of 200 metres measured from the low water mark".⁶⁷

The above claim was amended by the Political Constitution of 1 November 1950. Article 5 of the Political Constitution read as follows:

"The national territory extends between the Atlantic to the Pacific Oceans and the Republics of Honduras and Costa Rica. It also comprises: the adjacent islands, the subsoil, the territorial waters, the continental shelf, the submerged foundations (zocalos submarinos), the air space and the stratosphere".⁶⁸

As can be seen the claim was extended to include the superjacent waters of the continental shelf without giving any precise limit to the outer boundary of the national territory.⁶⁹ This, as will be discussed shortly, was due to the fact that a boundary for the purpose of exercising sovereignty over the "Maritime Zone" which was being discussed

66. See Background Material on the Activities in the Organization of American States Relating to the Law of the Sea, Pan American Union, 1957, p. 43. See also Auguste, Op. Cit., in note 17 (p. 11), p. 132.

67. Background Material on the Activities in the Organization of American States, Op. Cit., in note 66 (p. 93), at p. 43.

68. UNLS, Laws and Regulations on the Regime of the High Seas, Vol. 1, 1951, p. 15.

69. 'The Law of the Sea', The Society of Comparative Legislation and International Law, 1958, p. 40. Auguste, Op. Cit., in note 17 (p. 11), p. 132.

among some Latin American States was under consideration by the Nicaraguan Government.⁷⁰

4. Ecuador - In a Decree dated 21 February 1951 the Congress of the Republic of Ecuador extended the breadth of the territorial waters of the Republic to a minimum of 12 miles (Art. 3) and Article 1 of the same Decree referred to the continental shelf.⁷¹ It stated:

"The continental shelf or 'zocle' adjacent to the Ecuadorian coasts and all and every natural resources found thereon belong to the State, which will control the exploitation of such resources and the protection of the corresponding fishing areas".⁷²

Article 2 added that:

"The Ecuadorian continental shelf is considered to comprise the submerged land, contiguous to continental territory, which is covered by not more than 200 metres of water".⁷³

On 22 February 1951, the Presidential Decree relating to "The Law on Sea Fishing and Hunting" was issued. Article 1 of the latter Decree stated:

"The State exercises its sovereignty over the territorial waters (seas, insular and continental waters, lakes, ponds and river systems) and their resources".⁷⁴

70. See below (ii) (3) "The Maritime Zone Declaration of 1952".

71. Decree of the Congress of the Republic of Ecuador, Dated 21 February 1951, Relating to Territorial Waters, UNLS, Laws and Regulations on the Regime of the Territorial Sea, 1957, p. 13.

72. Ibid.

73. Ibid.

74. See Fisheries Case (United Kingdom v. Norway), ICJ. 1951, Report, Vol. IV (Oral Proceedings-Documents-Correspondence) p. 589.

In the First Decree, the Government of Ecuador claimed ownership over the continental shelf and although it referred to the continental shelf in its geological concept the claim was extended to control and protect "the corresponding fishing areas". This claim as well as the claim to extend the territorial waters to 12 nautical miles drew a protest from the United Kingdom Government.⁷⁵

It is also important to note the legal significance and meaning of 'continental waters' in Article 1 of the

-
75. On 14th September, 1951 the United Kingdom Government, in a note to the Government of Ecuador protested against the 12 mile limit asserted by Ecuador. The note further referred to Article 1 of the Decree of Congress of Ecuador regarding the continental shelf and stated inter alia that:
- "His Majesty's Government are not opposed in principle to the claim of the Republic of Ecuador to exercise control over the resources of the continental shelf contiguous to the coast of Ecuador up to a depth of 200 metres even if such control extends beyond the internationally recognized limit of territorial waters (i.e. 3 miles). His Majesty's Government cannot, however, accept any Ecuadorian claim generally to control fishing areas outside the 3-mile limit of territorial waters. His Majesty's Government wish to draw the attention of the Government of Ecuador to Article 3 of Part I of the Annex to the report of the International Law Commission covering its third session, 16th May- 27th July, 1951 (U.N. doc. A/C.N.4/48 of 30th July, 1951, at p. 57), which, in their view accurately states the existing law on this subject. The article says
- 'The exercise by a coastal State of control and jurisdiction over the continental shelf does not affect the legal status of the superjacent waters as high seas'". See Fisheries Case (United Kingdom v. Norway) ICJ Report, 1951, Vol. IV, pp. 589-590. For further discussion on the legal effect of protests see below Chapter VII, "Legal Status of Unilateral Declarations in International Law".

above Decree. Whether this is a reference to the super-jacent waters of the continental shelf is not clear. If it is, by claiming ownership of the continental shelf in Article 1 of the Decree of 21 February, 1951, and then sovereignty over the 'continental waters' and their resources, Ecuador practically extended its territorial waters to the 200 metres depth of the continental shelf since the rights claimed were equivalent to those regarding its territorial waters.

Following the above two Decrees, Ecuador joined Chile and Peru in claiming a 200 mile maritime zone and full sovereignty over the natural resources of the said area in 1952.⁷⁶

5. Guatemala - In 1949 the Petroleum Law of Guatemala referred to the resources of petroleum in its continental shelf stating in Article 1 that:

"All deposits of natural resources of petroleum within the land or sea boundaries of the Republic, up the extremity of the continental shelf or platform of the Republic, shall, whether they lie on or under the earth, lakes, rivers or seas, be the property of the nation. The direct dominium over them is inalienable and imprescriptible".⁷⁷

Guatemala, however, joined the other Central American States in 1955 when they issued the Declaration of Antigua which affirmed inter alia "...their intention to defend

76. See below (ii) (3) "The Maritime Zone Declaration of 1952.

77. Petroleum Law, enacted by Legislative Decree No. 649, 30 August 1949, UNLS, Laws and Regulations on the Regime of the High Seas, Vol. 1, 1951, pp. 10-11.

the territorial, economic and cultural heritage of the Central American States, the first named to include the continental shelf and territorial and epicontinental seas, so that their use would redound to the full benefit of their peoples".⁷⁸

The Petroleum Law remained, and was understood as a claim to the continental shelf until 1 March 1956 when a direct claim to the continental shelf was made in the new Constitution of the Republic of Guatemala.⁷⁹ Article 3 of the Constitution of 1956 stated:

"The public domain shall include all Guatemalan territory, soil, subsoil, territorial sea, continental shelf and air space and shall extend to the natural resources and wealth existing therein, without prejudice to free maritime and air navigation in accordance with the law and the provisions of international treaties and conventions".⁸⁰

Paragraph 4 of Article 214 of the above Constitution referred to the following as national property:

"The maritime zone of the territory of the Republic, the continental shelf, the air space and the stratosphere, to the extend and the manner specified by Law".⁸¹

It is obvious from the aforesaid documents that the claim over the seabed and subsoil of the continental shelf by Guatemala began with direct reference to petroleum in

78. The Antigua Declaration was issued by the Ministers of Foreign Affairs of Central American States in 1955, see UN. Doc. A/CONF. 13/19, p. 284, cited by Auguste, Op. Cit., in note 17 (p. 11), p. 126.

79. UNLS, Laws and Regulations on the Regime of the Territorial Sea, 1957, pp. 19-20.

80. Ibid., p. 19.

81. Ibid.

1949. Furthermore, it referred to the continental shelf in its general concept. This attitude, however, changed and, as mentioned above, the 1955 Declaration of Antigua which referred to the economic and cultural interests of the Central American States treated the continental shelf and territorial and epicontinental seas on the same footing. Finally the 1956 Constitution of the Republic of Guatemala, while claiming sovereignty over the continental shelf, failed to recognize the freedom of fishing in the superjacent waters of the continental shelf.

6. Iceland - Article 1 of Law No. 44 of 5 April 1948 concerning the continental shelf of Iceland stated:

"The Ministry of Fisheries shall issue regulations establishing explicitly bounded conservation zones within the limits of the continental shelf of Iceland; wherein all fisheries shall be subject to Icelandic rules and control....".⁸²

In a Commentary submitted to the Icelandic Parliament the limit of the continental shelf was stated as follows:

"At present, the limit of the continental shelf may be considered as being established precisely at a depth of 100 fathoms...".⁸³

It is interesting to note that the claim by Iceland was directly concerned with the superjacent waters and its fisheries.

82. "Law No. 44 of April 1948 Concerning the Scientific Conservation of the Continental Shelf, as Amended", UNLS, Laws and Regulations on the Regime of the Territorial Sea, 1957, pp. 513-514.

83. Ibid., pp. 514-515.

7. Cambodia - In 1957 the Government of Cambodia claimed sovereignty over the continental shelf up to a 50 metres isobath. The sovereignty was also extended to the superjacent waters of the continental shelf.⁸⁴

With the exception of Pakistan the above mentioned States having originally claimed sovereignty over the continental shelf in its geological concept, later changed their positions.⁸⁵ As well as sovereignty over the continental shelf and its resources they extended their claims to the superjacent waters of the continental shelf.

The change of policy was mainly due to the fact that the doctrine of the continental shelf had not yet been established as a new rule or custom in international law and therefore there was no legal binding requirement to impose on all coastal States the adoption of the United States policy.⁸⁶ Thus the claim of Argentina to the continental

84. 'The Law of the Sea', The Society of Comparative Legislation and International Law, 1958, p. 36, cited by Auguste, Op. Cit., in note 17 (p. 11), p. 80. By an Order in Council dated 21 December 1950, the United Kingdom Government claimed the seabed and sub-soil contiguous to the coasts of the Falkland Islands, but not beyond the 100 fathoms depth of the superjacent waters, UNLS, Laws and Regulations on the Regime of the High Seas, Vol. I, 1951, p. 305. Three other States: Ivory Coast (1967), Senegal (1961) and NorthYemen (1967) also claimed sovereignty over the continental shelf with a precise depth limit of 200 metres, see Houston Lay, Rubin Churchill and Myron Nordquist, New Directions in the Law of the Sea, Documents, Vol. II, 1973, pp. 835-854.

85. Lay et al, New Directions in the Law of the Sea, Op. Cit., in note 84 (p. 99), p. 838.

86. Kunz, Loc. Cit., in note 36 (p. 78), pp. 828-831.

shelf and epicontinental sea and the claims of Chile and Peru which referred to the unity or entity of the maritime zone, comprising the continental shelf and its superjacent waters, revealed that the living resources of the superjacent waters of the continental shelf were at least as important to some coastal States as mineral resources.⁸⁷

It should also be noted that during the 1951 Session of the International Law Commission for the Codification of the Law of the Sea a draft article was introduced and adopted giving coastal States rights to exploit their continental shelves to a depth of 200 metres or beyond that limit to where the superjacent waters permit exploitation.⁸⁸ This draft article, even before it was finally adopted by the 1958 Geneva Convention on the Continental Shelf, had an immediate effect and almost all coastal States then employed the additional exploitability criterion in their claims. Thus the 200 metres depth as a geological basis for drawing the line and limiting the coastal States' sovereignty or jurisdiction and control became obsolete. Nor was it important whether or not a continental shelf existed in a geological sense in order for any claim to be made.

87. See below (ii) "Claims to Submarine Areas with a Precise Width Limit".

88. UN. Doc. A/1858, 17 (1951). For the development of the continental shelf doctrine by the ILC and the First United Nations Conference on the Law of the Sea (1958) see below Chapter IV.

ii. Claims to Submarine Areas with a Precise Width Limit

The most important element in this group of claims is the inclusion of the superjacent waters and their resources within the scope of the continental shelf. This was initiated by Argentina in its Presidential Proclamation issued on 11 October 1946 and although it did not refer to any specific limit regarding the claim it had great influence on the subsequent claims made by other Latin American States.⁸⁹ In the preamble of the above Proclamation it was stated:

"The submarine platform, known also as the submarine plateau or continental shelf, is closely united to the mainland both in a morphological and geological sense;
The waters covering the submarine platform constitute the epicontinental seas, characterized by extraordinary biological activity, owing to the influence of the sunlight, which stimulates plant life (algae, mosses, etc.) and the life of innumerable species of animals, both susceptible of industrial utilization".⁹⁰

Article 1 of the Presidential Decree stated:

"It is hereby declared that Argentine epicontinental sea and continental shelf are subject to the sovereign power of the nation".⁹¹

Article 2 stated:

"For purposes of free navigation, the character of the waters situated in the Argentine epicontinental sea and above the Argentine continental shelf, remains unaffected by the present Declaration".⁹²

89. Decree No. 14,708, Concerning National Sovereignty Over Epicontinental Sea and the Argentine Continental Shelf, 11 October 1946, UNLS, Laws and Regulations on the Regime of the High Seas, Vol. I, 1951, pp. 4-5.

90. Ibid., p. 4.

91. Ibid., p. 5.

92. Ibid.

The concept of unity of the shelf and its superjacent waters put forward by Argentina was followed by Chile, Peru and some other Latin American States.⁹³ The main difference between the latter declarations and that of Argentina was that they claimed sovereignty over the continental shelf and its superjacent waters up to a distance of 200 nautical miles.

1. Chile

In a Presidential Declaration issued in June 1947 the Government of Chile claimed sovereignty over the seabed and subsoil of the continental shelf whatever their depth, and over "the maritime zone", that is, a zone of 200 nautical miles from her coasts and the coasts of her islands in the following terms:⁹⁴

" (1) The Government of Chile confirms and proclaims its national sovereignty over all the continental shelf adjacent to the continental and island coasts of its national territory, whatever may be their depth below the sea, and claims by consequences all the natural riches which exist on the said shelf, both in and under it, known or to be discovered.

(2) The Government of Chile confirms and proclaims its national sovereignty over the seas adjacent to its coasts whatever may be their depth, and within those limits necessary in order to reserve, protect, preserve and exploit the natural resources of whatever nature found on, within and below the said seas, placing within the control of the government especially all fisheries and whaling activities with the object of preventing the exploitation of natural riches of this kind to the detriment of the inhabitants of Chile and to prevent the spoiling or

93. See below (2) "Other Latin American Claims".

94. Presidential Declaration Concerning Continental Shelf, 23 June 1947, UNLS, Laws and Regulations on the Regime of the High Seas, Vol. I, 1951, pp. 6-7.

destruction of the said riches to the detriment of the country and the American continent.

(3) ...Protection and control is hereby declared immediately over all the seas contained within the perimeter formed by the coast and the mathematical parallel projected into the sea at a distance of 200 nautical miles from the coasts of Chilean territory....".⁹⁵

The principal reason for Chile's claim to the continental shelf of whatever depth was based on the fact that she had a very narrow continental shelf.⁹⁶ Thus the use of the term 'continental shelf' with addition of 'whatever may be their depth' is geologically wrong because the continental shelf, as discussed earlier, can only be conceived of where the submarine area is the continuation of the land mass under the sea water to the point where it slopes down.⁹⁷ The limit of 200 nautical miles "was chosen as corresponding to the outer limit of the Humboldt Current".⁹⁸ The Humboldt Current was referred to by Rivera Morfan as:

"....the principal cause of the riches of our seas".⁹⁹

It is clear that the Chilean claim was contrary to the concept of the continental shelf as formulated by the United States in 1945. The Chilean claim was criticized by many jurists and was considered as a claim to 200 miles

95. Ibid. The right of free navigation was recognised in Paragraph 4 of the Presidential Declaration, *ibid.*

96. Kunz, *Loc. Cit.*, in note 36 (p. 78), p. 834.

97. See above pp. 3-7.

98. L.D.M. Nelson, "The Patrimonial Sea" 22 ICLQ (1973), pp. 668-686, at p. 670 (note 11).

99. Jaime Rivera Marfan, La Declaracion Sobre Zona Maritima de 1952, Chile, 1968, p. 33, cited by Nelson,

territorial waters.¹⁰⁰ Furthermore, as will be seen, it was protested against by both the United States and the United Kingdom Governments.¹⁰¹

Loc. Cit., in note 98 (p. 103), p. 670.

100. According to Green "It is insufficient to base claims on an alleged legal doctrine of the continental shelf, which, as we have seen, the International Law Commission regards as unnecessary, recognising claims to exploit marine resources regardless of the existence of the shelf, while some States, like Chile, pay but lip service to the concept in order to claim vast areas of territory for themselves", L.C. Green, "The Continental Shelf", 4 Current Legal Problems (1951) p. 79; According to Mr J. P. Keith there were "...attempts by a few countries, such as Chile, to use the cover of the continental shelf theory in order to make claims which have nothing whatever to do with the continental shelf", Report of the ILC, 1950, p. 94; Kunz also pointed out that "...these claims have nothing to do with the doctrine of the continental shelf, nor with the contiguous zone", Loc. Cit., in note 36 (p. 78), p. 844. In its comments on the ILC's draft articles of 1951 the Chilean Government summarised its policy regarding the 200 miles sovereignty over the continental shelf and its superjacent waters and sought to justify it on the following grounds: " (1) the special configuration of the submarine shelf along the coasts of Chile; (2) the exploitation of the fisheries, which are of vital concern to Chile; (3) the inadequacy of three miles of territorial sea for protecting the fishing industry and preventing destruction of marine life; and (4) the improper jurisdiction exercised in the past and present by certain foreign vessels over Chilean fishermen, whose living comes mainly from the sea", Report of the ILC to the General Assembly, Yearbook of ILC, Vol. II, 1953, p. 245. "The Chilean Proclamation related primarily to an extension of Chile's territorial waters", statement by Mr Cordova (a member of the ILC) during the 69th Meeting of the ILC in 1950, YBILC (1950) at p. 237, para. 110, and Professor Brierly stated: "The Chilean Proclamation represented a claim to extend the country's territorial waters to a very large area", Ibid., p. 237, para. 111. But Mouton in 1952 observed "The claim of 200 miles sounds extravagant, it is true, but the basis of their claims is not unsound". Op. Cit., in note 3 (p. 65), at p. 81.

101. See the Fisheries Case (United Kingdom v. Norway), in note 75 (p. 95), Vol. II, pp. 747-752, and Vol. IV, pp. 581-597 and pp. 599-605; Mouton, Op. Cit., in note 3 (P. 65), pp. 89-96.

Referring to the Chilean Proclamation, Auguste noted that:

"The claim of sovereignty over the 'shelf' is the base from which the broader claims are drawn: the mutual connexion of sea and 'shelf' was paramount in this declaration".¹⁰²

He further observed that:

"...this idea of an extended sovereignty over the continental shelf and the adjacent seas realized itself, if not according to the Argentinian concept of an entity, certainly in that of a general 'Maritime Zone'".¹⁰³

2. Other Latin American Claims

The 200 nautical miles sovereignty over the submarine area and its superjacent waters was also claimed by Peru,¹⁰⁴ Costa Rica,¹⁰⁵ El Salvador¹⁰⁶ and Honduras.¹⁰⁷ All these States claimed sovereignty over the continental shelf and the corresponding superjacent waters up to 200 nautical miles. They all recognized the freedom of navigation within that limit.

102. Auguste, Op. Cit., in note 17 (p. 11), at p. 112.

103. Ibid., p. 113.

104. Presidential Decree No. 781 of 1 August 1947 Concerning the Submerged Continental or Insular Shelf, UNLS, Laws and Regulations on the Regime of the Territorial Sea, 1957, pp. 38-39.

105. Decree-Law No. 803, Concerning Continental Shelf and Insular Shelf, 2 November 1949, UNLS, Laws and Regulations on the Regime of the High Seas, Vol. I, 1951, pp. 9-10.

106. Political Constitution, 7 September 1950, *ibid.*, p. 300.

107. Decree No. 96, issued by President of the Republic in the Council of Ministers on 28 January 1950, *ibid.*, pp. 302-303.

As mentioned earlier these claims were strongly protested against by both the United States and the United Kingdom Governments. In a note of protest from the British Embassy in Lima delivered to the Peruvian Minister of Foreign Affairs on 6th February 1948 it was stated inter alia that:¹⁰⁸

"...His Majesty's Government in the United Kingdom, while not opposed in principle to claims to the exercise of sovereignty over the sea bed contiguous to the Peruvian coast, are unable to accept the claims set forth in the declaration of 1st August 1947.

The Peruvian Government's action, on the other hand, in claiming that sovereignty may be extended over the large areas of the high seas above the continental shelf appears to be quite irreconcilable with any accepted principle of international law, governing the extent of territorial waters, hitherto recognized by the Peruvian Government or the great majority of other maritime States...

While recognizing therefore that the protection and control of fisheries and conservation of the natural resources in the seas are the legitimate concern of any country within those waters over which its territorial jurisdiction extends, His Majesty's Government are obliged to place firmly on record with the Peruvian Government that they do not recognize territorial jurisdiction over waters outside the limit of 3 miles from the coast; nor will they regard British Vessels engaged in their lawful pursuit on the high seas as being subject, without the consent of His Majesty's Government, to any measures which the Peruvian Government may see fit to promulgate in pursuance of the declaration".¹⁰⁹

108. See Fisheries Case (United Kingdom v. Norway), in note 75 (p. 95), Vol. II, Written Statements, pp. 747-749.

109. Ibid. For a similar protest against the Chilean Declaration by the United Kingdom see *ibid*, pp. 750-752. And for protests against claims by Honduras, Ecuador, Costa Rica and El Salvador see *ibid*, Vol. IV, Oral Proceedings, pp. 581-597. For the texts of the United States protests to Governments of Chile,

Strong protests by the United Kingdom and the United States notwithstanding, the concept of unity of the shelf and its superjacent waters within a limit of 200 nautical miles found increasing support among Latin American States. This unity, with its limit, emerged as new concept known as the "Maritime Zone".

Apart from the Latin American States claiming 200 miles sovereignty over the continental shelf and its superjacent waters, the only other State asserting similar rights was Korea.¹¹⁰ The Korean Proclamation produced a demarcation line within which it claimed sovereignty.¹¹¹ This Proclamation also recognized the freedom of navigation within the areas claimed.¹¹²

3. The Maritime Zone Declaration of 1952

The concept of the Maritime Zone was introduced and adopted when the delegates of Chile, Ecuador and Peru met at Santiago de Chile and signed an agreement known as the Declaration on the Maritime zone on 18 August 1952.¹¹³

El Salvador, Argentina, Peru and Ecuador see *ibid*, pp. 599-604. It must be added that in a letter dated 7th April 1951 from the French Government to the United Kingdom Government the former supported the latter in her protests against those Latin American States, *ibid*, p. 605.

- 110. Presidential Proclamation of Sovereignty over Adjacent Seas, 18 January 1952, UNLS, Laws and Regulations on Regime of the Territorial Sea, 1957, pp. 30-31.
- 111. *Ibid.*, p. 31.
- 112. For full discussion on Korean Declaration see below Chapter VIII (iv) "Dispute Between Japan and the Republic of Korea".
- 113. Agreement between Chile, Ecuador and Peru, Signed at the First Conference on the Exploitation and Conservation of the Maritime Resources of the South Pacific, Santiago, 18 August 1952, Lay et al, New

The Declaration stated inter alia:

" (I) Owing to the geological and biological factors affecting the existence, conservation and development of the marine fauna and flora of the waters adjacent to the coasts of the declarant Countries, the former extent of the territorial sea and contiguous zone is insufficient to permit of the conservation, development and use of those resources, to which the coastal Countries are entitled.

(II) The Governments of Chile, Ecuador and Peru therefore proclaim as a principle of their international maritime policy that each of them possesses sole sovereignty and jurisdiction over the area adjacent to the coast of its own Country and extending not less than 200 nautical miles from the said coast.

(III) Their sole jurisdiction and sovereignty over the zone thus described includes sole sovereignty and jurisdiction over the sea floor and subsoil thereof.

... ..
(V) This Declaration shall not be construed as disregarding the necessary restrictions on the exercise of sovereignty and jurisdiction imposed by international law to permit the innocent and inoffensive passage of vessels of all nations through the zone aforesaid".¹¹⁴

The concept of the Maritime Zone was based on three important contentions which were reflected in the above Declaration and can be described as follows;

a. In its Preamble the Declaration spoke of the Governments' obligations on an eco-social basis for the development of the area claimed. It stated that every Government had the duty to ensure that its people would have the

Directions in the Law of the Sea, Op. Cit., in note 84 (p. 99), Vol. I, pp. 231-232.

114. Ibid.

access necessary for their food supplies and concluded that it was therefore necessary to regulate and control the exploitation of these resources for the benefit of their own people.

b. The Declaration also maintained that due to the geological and biological factors determining the existence of marine fauna and flora, it was necessary to establish a zone within which the government could carry out an effective policy of conservation in order to ensure the maintenance and rational utilization of these resources. To ensure the effectiveness of conservation measures coastal States must have sovereignty over the whole zone, that is to say the sovereignty must be horizontal as well as vertical.

c. Finally the Declaration contended that "the former extent of the territorial sea and contiguous zone is insufficient to permit of the conservation, development and use of those resources, to which the coastal Countries are entitled".¹¹⁵

115. Commenting on the concept of the Maritime Zone Auguste stated:

"This particular practice of the C.E.P. States brought a new concept into the field of international relations. The concept was that of the Maritime Zone. It was in fact the relegation of the concept of the continental shelf to the fundamental but essentially scientific role of a component part in a more realistic and compact unit. Within this unit the purposes, the administrative regulations, the definitions of the necessary factors were embodied, resulting in the reduction of the 'shelf' to being only a (though an important) factor in the unit. The particular value of this concept lay in the definiteness of the

The above Declaration was interpreted as an extension of territorial waters on the grounds that as well as asserting sovereignty over the living and non-living resources of the area claimed, it also reduced the freedom of navigation to the right of "innocent and inoffensive passage".¹¹⁶

The Declaration of the Maritime Zone was ratified by all three States and was acceded to by Costa Rica on October 9, 1955.¹¹⁷

The concept of the Maritime Zone was thereafter gradually followed and adopted by most Latin American States which made further group Declarations such as the Montevideo Declaration, the Lima Declaration and the Santo Domingo Declaration.¹¹⁸

area encompassed, the strictness of the objectives in view, and the workability of the zone in practical terms". Op. Cit., in note 17 (p. 11), at p. 147.

116. According to Nelson "On the face of it, the Declaration of Santiago went beyond a mere assertion of a specialised, functional competence over adjacent maritime areas and in fact created very extensive territorial waters". Loc. Cit., in note 98 (p. 103), at p. 671.
117. It is important to note that the Costa Rican Sala de Casacion in Jones Boden v. Han Daniels (1950) held that the breadth of Costa Rican territorial sea was three miles, 10 ILM (1971) p. 1273. Nelson notes that the "Costa Rican Minister of Foreign Affairs stated in 1968 that Costa Rican Legislation was not to be interpreted as a claim to exclusive jurisdiction with respect to fisheries, but as expressing the Country's interest in Conservation of resources". Loc. Cit., in note 98 (p. 103), p. 671.
118. For the Texts of the above Declarations see Lay et al, *New Directions in the Law of the Sea*, Op. Cit., in note 84 (p. 99), Vol. I, pp. 235-249; Nelson, Loc. Cit., in note 98 (p. 103), pp. 668-689.

The exercise of sovereignty over the 200 mile Maritime Zone by some Latin American States led to some serious incidents between 1953 and 1958.¹¹⁹

The concept of the Maritime Zone made a great contribution to the development of the Law of the Sea and, as will be shown, this was the basis of the 200 nautical mile Fishery Zone or Exclusive Economic Zone adopted by almost all coastal States during the 1970's.¹²⁰

119. See below Chapter VIII (A) "Disputes Concerning Unilateral Declarations".

120. According to FAO by 1978 there were 76 coastal States which had adopted 200 nautical miles as either territorial sea (mainly Latin American States) or as Fishery or Exclusive Economic Zone, Committee on Fisheries, 12th Session, Rome, 12- 16 June 1978, pp. 23-27. By the end of 1980 more than 90 coastal States had claimed 200 nautical mile as TS, FZ or EEZ, see FAO, Legislative Study No. 21, Legislation on Coastal State Requirements for Foreign Fishing, by Gerald More, Rome, 1981, pp. 328-334. For the development of the Law of the Sea between 1958 and 1973 see below Chapter IX. For the Third United Nations Conference on the Law of the Sea see below Chapter X.

iii. Claims to Submarine Areas without any Definite Limit

The claims to the continental shelf asserted by most States between 1945 and 1958 come under this category. The only common characteristic of these claims is that they are all in ambiguous terms this ambiguity concerns the nature of the rights claimed, the submarine areas and the natural resources involved.

Claims to the submarine areas without any definite limit and to their natural resources were made by the following Governments: Panama (1946)¹²¹, United Kingdom for Bahamas, Jamaica (1948)¹²², British Honduras (1950)¹²³, North Borneo, Sarawak and British Guiana (1954)¹²⁴, and for the following nine Arab Sheikdoms in 1949 (Bahrain, Qatar, Kuwait, Abu Dhabi, Ajman, Dubai, Sharajah, Umm Al

121. Article 209 of Constitution, 1 March 1946 stated:
"The following belong to the State and are of public use...

... ..
(4) The aerial space and the submarine continental shelf which appertain to the national territory".
UNLS, Laws and Regulation on the Regime of the High Seas, Vol. I, 1951, pp. 15-16, at p. 15.

122. Ibid., pp. 30-33.

123. Ibid., pp. 304-305.

124. See Statutory Instruments, 1954, No. 838: North Borneo (alteration of boundaries) Order in Council 1954, Laws of North Borneo 1953-1954, Vol. VII, Supplement Volume, p. 637. For Sarawak see The Sarawak Government Gazette Part II, Vol. IX, No. 18, 1954, p.200. For British Guiana see Statutory Instruments 1954, Part 1, p. 506, cited by Auguste, Op. Cit., in note 17 (p. 11), p. 77.

Qaiwain and Ras Al Khaimah)¹²⁵, Philippines (1949)¹²⁶, Saudi Arabia (1949)¹²⁷, Brazil (1950)¹²⁸, Israel (1952)¹²⁹, Dominican Republic (1952)¹³⁰, Australia (1953)¹³¹, Guyana (1954)¹³², Brunei (1954)¹³³, India (1955)¹³⁴, Iran (1955)¹³⁵,

-
125. UNLS, Laws and Regulations on the Regime of the High Seas, Vol. I, 1951, pp. 23-30. According to Professor Brown:
"Proceeding next to the practice of other States, the influence of the Truman Proclamation is very clear in the formulation of the proclamations, acts and orders issued by the United Kingdom for the Arab protected States. They are equally vague on the outer limit of the continental shelf. Other British colonial legislation is just as flexible, referring in varying, but substantially similar, language to such areas as 'the land underlying the sea waters below high water mark' and the 'continental shelf which lies beneath the sea contiguous to the coasts'...or, 'the continental shelf, being the sea-bed and subsoil which lies beneath the high seas contiguous to the territorial waters'". E.D. Brown, *Op. Cit.*, in note 21 (p. 14), at p. 23.
126. Article 3 of Petroleum Act of 1949 under the heading "State Ownership" stated: "All natural deposits or occurrences of petroleum or natural gas in public and/or private lands in the Philippines, whether found in, on or under the surface of dry lands, creeks, rivers, lakes, or other submerged lands within the territorial waters or on the continental shelf... which are not within the territories of other countries, belong to the State, inalienably and imprescriptibly". UNLS, Laws and Regulations on the Regime of the High Seas, Vol. I, 1951, p. 19.
127. *Ibid.*, p. 22.
128. *Ibid.*, pp. 299-300.
129. UNLS, Supplement to Laws and Regulations on the Regime of the High Seas, 1959, p. 14.
130. UNLS, Laws and Regulations on the Regime of the Territorial Sea, 1957, pp. 11-12.
131. Common Wealth of Australia Gazette No. 56, 11 September 1953. See also below Chapter VIII (iii).
132. Lay et al, *New Directions in the Law of the Sea*, *Op. Cit.*, in note 84 (99), Vol. II, at p. 843.
133. Brunei Laws, Statutes, etc., Enactments 1952-1955, at p. 159.
134. UNLS, Supplement, *Op. Cit.*, in note 129 (p. 113), pp.

Cuba (1955)¹³⁶, Venezuela (1956)¹³⁷, Portugal (1956)¹³⁸,
Iraq (1957)¹³⁹, Sri Lanka (1957)¹⁴⁰ and Spain (1958)¹⁴¹.

13-14.

135. UNLS, Laws and Regulations on the Regime of the Territorial Sea, 1957, p. 25.
136. Article 2 of Decree Law No. 1948 of 25 January 1955 stated: "Measures, legal and administrative as well as technical, necessary for the protection and conservation of maritime resources in the zone of the high seas contiguous to the Cuban territorial waters, are proclaimed to be within the powers of the State". See S.A. Bayitch, Inter-American Law of Fisheries, 1957, p. 28, see also UNLS, Laws and Regulations on the Regime of the Territorial Sea, 1957, p. 8.
137. Article 4 of the Law of 23 July 1956 stated: "The soil and the subsoil of the continental shelf adjacent to the territory of the Republic of Venezuela, beyond the zone of the territorial sea to a depth of 200 metres or as far as the depth of these waters beyond these limits permits exploitation of the resources of the soil and subsoil... belong to the Republic of Venezuela and are subject to its sovereignty". Inter-American Law of Fisheries, Op. Cit., in note 136 (p. 114), at p. 35.
138. UNLS, Supplement, Op. Cit., in note 129 (p. 113), at p. 16. Section 1 of the Portuguese Act No. 2080 stated: "The sea bed and the corresponding subsoil of the submarine platforms adjacent to the Portuguese sea-coast... belong, even beyond the limits of the territorial sea, to the public domain of the State..." And Section 2 stated: "The exploration of the Continental Shelf shall not imply any additional limitations of the regime of the high seas concerning the epicontinental sea which are not authorized by international law". Ibid.
139. UN Doc. A/CONF. 13/39, at p. 65.
140. Lay et al, New Directions in the Law of the Sea, Op. Cit., in note 84 (p. 99), Vol. II, at p. 839.
141. Ibid., p. 846. For detail analysis on the claims made by Argentina, Brazil, Chile, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru and Venezuela, see Auguste, Op. Cit., in note 17 (p. 11), pp. 105-139.

Although the scope and the nature of the claims differed, they all referred either to the continental shelf or to the submarine areas adjacent to their coasts. Neither the area to which they referred nor the kind of resources included therein was ever clearly defined. Saudi Arabia and other Arab States under the protection of the United Kingdom followed the United States policy i.e they claimed control and jurisdiction over the contiguous submarine areas and specifically acknowledged the freedom of fishing and navigation.¹⁴² Brazil, on the other hand, claimed the continental shelf as an integral part of the Brazilian territory. The Proclamation referred to the natural resources of the continental shelf being "subject to federal authorization or concession".¹⁴³ Article 3 of the Brazilian Proclamation stated that:

"The rules governing navigation in the waters covering the aforesaid continental shelf shall continue in force without prejudice to any further rules which may be made, especially as regards fishing in that area".¹⁴⁴

It is clear that the specific reference to fishing in the waters above the continental shelf put this Proclamation more in line with those of Chile, Argentina and Peru than that of the United States.

Panama claimed the continental shelf for fishery

142. UNLS, Laws and Regulations on the Regime of the High Seas, Vol. I, 1951, pp. 23-33.

143. Ibid., pp. 299-300

144. Ibid., p. 300.

purposes. Article 3 of the Decree No. 449 of 1946 stated:

"For the purposes of fisheries in general, national jurisdiction over the territorial waters of the Republic extends to all the space above the seabed of the submarine continental shelf. For this reason the product of any fishing within the limits indicated is considered a national product, and is therefore subject to the provision of the present decree".¹⁴⁵

In 1953, the Governor-General of Australia issued two Proclamations regarding the continental shelf of Australia and the continental shelf of the Territory of New Guinea.¹⁴⁶ These Proclamations referred to the sovereign rights of Australia over the natural resources of the seabed and subsoil of the continental shelf. Later, on 25 September 1953, another Proclamation was issued which brought into operation the Pearl Fisheries Act of 1952 and was incorporated within the Proclamation of 1953 on the continental shelf.¹⁴⁷ The significance of this move was to bring pearl, beche-de-mer, trochus and green snail within the scope of the natural resources of the continental shelf.¹⁴⁸

145. Ibid., p. 16.

146. Commonwealth of Australia Gazette, 1953, No. 56, p. 2563. See also below Chapter VIII (iii).

147. Pearl Fisheries Act 1952, No. 8, Commonwealth Acts, 1952, Vol. 1, p. 32, 1 Sydney Law Review (1953), pp. 96-104.

148. See below Chapter VIII (iii).

Conclusion

The doctrine of the continental shelf was initiated by the United States in a Presidential Proclamation in 1945.¹⁴⁹ The continental shelf was not defined in the Proclamation; it referred to "...the subsoil and seabed of the continental shelf beneath the high seas, but contiguous to the coasts of the United States".¹⁵⁰ Although the Proclamation referred to the natural resources of the continental shelf the prime object for the claim was the exploitation of petroleum. The outer limit of the continental shelf was not specified in the Proclamation while the rights claimed were jurisdiction and control over the natural resources of the continental shelf. The Proclamation specifically referred to the superjacent waters of the continental shelf as remaining as high seas and therefore open to free navigation and fishing.

The United States' Proclamation was followed by a number of claims by other coastal States. These claims, while referring to the continental shelf, were largely affected by the particular interests of the claimant States. The geographical configuration of the adjacent submarine areas on the one hand, and the particular interest in fishery resources on the other hand, dictated the terms of the claims.¹⁵¹ There is no doubt that both claims

149. See above pp. 72-86.

150. See above at p. 76.

151. See above at pp. 86-116.

asserting national sovereignty over the submarine areas which are not continental shelf proper and those seeking to protect and control fisheries beyond the limit of the territorial sea by excluding other States from their customary and internationally established rights in the high seas were beyond the scope of the doctrine of the continental shelf as formulated in 1945.

The main problem regarding all the claims made between 1945 and 1958 was whether they were in conformity with the rules and customs of international law. In this respect States were divided into two groups. First, those which argued that the freedom of the high seas must be maintained and respected. The United States, Japan, France, The United Kingdom and many others supported this view. According to these States the sovereign rights of the coastal States over the continental shelf must not interfere with the freedom of either fishing or navigation beyond the three mile limit of the territorial sea. Secondly, those which considered the existing rules and customs regarding the Law of the Sea insufficient to meet socio-economic development. Their main argument was based on the unity of the shelf and its superjacent waters and urged for new laws regarding the exploitation of the natural resources of the seabed, subsoil and its superjacent waters beyond the territorial sea.

The doctrine of the continental shelf developed, therefore, through unilateral assertion of rights in two different directions.

CHAPTER IV

UNITED NATIONS AND THE FIRST CONFERENCE
ON THE LAW OF THE SEA

Introduction

In 1949, the Secretary-General of the United Nations submitted a memorandum to the International Law Commission entitled "Survey of international law in relation to the work of Codification of the International Commission."¹ Among the fourteen selected provisional topics the Commission included (with priority) the Regime of the High Seas and that of Territorial Waters.²

In 1950, at the Second Session of the ILC Mr. François, the Committee's Rapporteur, reported on the Regime of the High Seas and referred to the concept of the Continental Shelf and its recent development. While Mr. François observed that at that time it would be impossible to recognise the legal validity of the claims to the Continental Shelf in international law, he admitted that "the fact that an ever-increasing number of States are claiming rights to the Continental Shelf shows the very real need that exists for restricting the principle of the freedom of the seas".³ He concluded that:

"...it is therefore to be conjectured whether a better solution would not be to discard the

1. UN Doc. A/CN.4/1/Rev. 1; see YBILC, First Session, 1949, pp. 9-10.

2. Ibid., pp. 280-281.

3. UN Doc. A/CN.4/17, at p. 38, YBILC, 1950, Vol. II, pp. 36-52.

idea of the continental shelf and to grant States special rights in the sea zones beyond their territorial waters to a specific distance. In other words, the principle would be adopted of granting special rights for working the mineral resources of the subsoil and for the protection of marine resources in a contiguous zone of a special breadth, disregarding the existence of the continental shelf".⁴

The ILC agreed at this session that it was necessary to discuss the concept of the continental shelf since it "recognized the great importance, for the economic and social, as well as for the juridical points of view, of the exploitation of the seabed and subsoil of the continental shelf".⁵

The Commission's decision to discuss the exploration and the exploitation of the continental shelf and its natural resources was based on considerations of the need:

a. to preserve and protect the freedom of the high seas; b. to establish uniformity among States concerning their claims to the continental shelf.

The first factor, which is the most important element in the ILC's consideration of the question of the continental shelf, has been well described by Professor Lauterpacht:

"...the task of codification, confronted with an acute divergence of practice in a matter affecting important interests of States, calls for a combination of legislative activity with measured adherence to a legal rule sanctioned by tradition and by consideration of unimpaired validity. For the validity of the freedom of

4. UN. Doc. A/CN.4/17, at p. 40.

5. YBILC, 1950, Vol. II, p. 384, Para. 198.

the sea is far from spent. However, that principle can be preserved only by dint of its being adjusted to the reasonably conceived interests of the Coastal States and, in relation to the high seas proper, through the adoption of rules which will prevent the freedom of the seas from becoming a regime of anarchy and waste. It is in this light that the articles finally drafted by the International Law Commission in 1953 in the matter of Fisheries and the Continental Shelf must be viewed".⁶

At its third Session in 1951 the ILC adopted a series of draft articles on the continental shelf and related subjects and sent them to governments for their comments.⁷ These were strongly criticized by most governments and jurists so the ILC provided a new draft articles in 1953 and again in 1956. The latter with a few amendments formed the basis of the 1958 Geneva Convention on the Continental Shelf.

This Chapter is mainly concerned with the definition, in the draft articles adopted by the ILC in 1951, 1953 and 1956 respectively, of the continental shelf and of its natural resources in relation to the rights vested in coastal States.⁸

6. See H. Lauterpacht, "Codification and Development of International Law", 49 AJIL (1955), pp. 16-43, at p. 26.

7. See Statute of the ILC, UN Publications (1949), Vol. V, Article 16 (i) and (j).

8. For the development of the continental shelf regime between 1958 and 1973 see below Chapter IX. For the proceedings of the UNCLOS III and State Practice regarding the exploitation of the natural resources of the continental shelf see below Chapter X.

A- The ILC's Draft Articles on the Continental Shelf

i. The ILC Definition of the Continental Shelf: 1951

At its Second Session in 1950, the Commission had before it Gidel's Memorandum on the Regime of the High Seas which suggested that "it seems advisable for jurists to rely on the common concept of the continental shelf".⁹ It was also pointed out that the Official Press Release which accompanied the United States Proclamation on the Continental Shelf in 1945¹⁰ referred to "the common definition of the shelf" i.e. the 100 fathoms isobath, which had the virtues of uniformity, fixity and certitude.¹¹

At its Third Session in 1951 the Commission in defining the continental shelf (Art. 1) decided to adopt the limit of 200 metres rather than distance limit which had also been proposed, and defined the continental shelf in the following terms:

"As here used, the term 'continental shelf' refers to the seabed and subsoil of the submarine areas contiguous to the coast, but outside the areas of marginal seas where the depth of the superjacent waters does not exceed 200 metres".¹²

As a result of subsequent discussions in its following meetings in 1951, the Commission decided to abandon the 200-metre depth limit in favour of the exploitability

9. YBILC, 1950, Vol. II, at p. 50.

10. "Press Release , 28 Sept. 1945" 13 Department of State Bulletin 484 (1945), see the text in UNLS, Laws and Regulations on the Regime of the High Seas, Vol. I, 1951, pp. 39-40.

11. YBILC, 1950, Vol. II, pp. 50-51.

12. YBILC, 1951, Vol. I, at. p. 273, para. 118.

criterion.¹³ The following reasons were given in support of the above change:

1. The most important obstacle to the adoption of a fixed limit was the physical configuration of the continental shelf. This would give rise to different coastal States having either a broad or a narrow share of their contiguous submarine areas which in the Commission's view was unjust. As well as the problem of having an unequal share there were two other problems regarding the physical configuration of the continental shelf:

- (a) in cases where the contiguous submarine areas are cut off by a trough (e.g. Norwegian coasts) and
- (b) in cases where the contiguous submarine areas do not reach the 200-metre depth at all (e.g. Persian Gulf).

In neither of these cases can the term continental shelf appropriately be used in its geological sense.¹⁴

2. The Commission's view on the nature of the rights of exploration and exploitation of the continental shelf was based on the fact that they did not consider that these rights could interfere with the freedom of the high seas since the sole purpose of the right was exploration and exploitation of the mineral resources of the continental shelf.¹⁵

13. Ibid., p. 346, paras. 2-7.

14. Ibid., pp. 296-301 and pp. 315-316.

15. UN. Doc. A/CN4/42, emphasis added.

In this regard the Commission did not think that it was necessary for coastal States to have a continental shelf in its geological sense in order to benefit from the mineral resources of the submarine areas contiguous to their coasts.

The Commission also discussed the possibility of future developments in off-shore exploitations and therefore decided that the 200-metre depth limit would itself become an obstacle to future developments concerning the exploitation of the continental shelf.

3. Before the redrafting of article (1) concerning the continental shelf the Commission had decided to allocate (as a matter of justice, or compensation) parts of their contiguous submarine areas to coastal States which did not possess any continental shelf, or had a very narrow shelf. They proposed that:

"The rights of control and jurisdiction referred to in the present chapter belong, up to a distance of twenty miles beyond territorial waters, to all coastal States which do not possess a continental shelf as defined in article 1".¹⁶

There was also the problem of the differences in scope and terminology of the claims which had been made between 1945 and 1951. The Commission considered that a more flexible definition of the continental shelf would embrace most of those claims and lead to uniformity of claims.

16. YBILC, 1951, Vol. II, p. 296, para. 25.

These were the main grounds on which the Commission decided to revise its draft article 1 on the continental shelf. The subsequent draft article which was finally adopted by the Commission in 1951 and which was communicated to governments for their comments read as follows:

"As here used, the term 'continental shelf' refers to the seabed and subsoil of the submarine areas contiguous to the coast, but outside the area of territorial waters, where the depth of the superjacent waters admits of the exploitation of the natural resources of the seabed and subsoil".¹⁷

This definition also was immediately criticized by most jurists and governments on the ground that it was vague and therefore would create conflicts among States. Waldock, referring to the exploitability criterion, said:

"This definition is extremely vague, being open to subjective interpretations by the coastal States which might result in very large claims".¹⁸

Mouton was of the same opinion.¹⁹ Young, while praising the work of the Commission in adopting the above definition, admitted that:

"...the long-range view taken by the Commission is highly creditable to it, and it is perhaps only quibbling about details to remark that the test of exploitability will itself require further definition eventually. In particular, questions may arise as to the geographical limits of an exploitable area".²⁰

Lauterpacht had already expressed his views on the doctrine of the continental shelf observing:

17. Ibid., p. 141.

18. UN. Doc. A/CN.4/60, at p. 23. Also see Report of the Forty Fifth Conference of the International Law Association, 1952, Lucerne, p. 143.

19. Mouton, Op. Cit, in note 3 (p. 65), pp. 43-44.

"The considerations here set forth are not intended to suggest that the notion of the continental shelf was devoid of usefulness from its very inception or that it can no longer fulfil any useful purpose whatever. It served as rallying-point for a new complex of ideas by giving it the authority of a natural geographical phenomenon. This it may continue to do. Moreover, whatever may be the merit of the 600-feet limit, it has the advantage of setting some limit. That limit, conceived as a rebuttable presumption of practicality of exploitation, is neither unreasonable nor one arbitrarily arrived at. It signifies an approximation, which probably errs on the side of optimism, to practical possibilities of the exploitation of the seabed and subsoil. It may thus provide a convenient starting-point for future regulation and agreement. But it must not be more than that".²¹

He also made the following comment on the limit of the continental shelf in 1953:

"An exact limit has the merit of clarity, which is extremely desirable, since in matters pertaining to the continental shelf some governments are inclined in addition to legitimate assertion of right, to make others".²²

On the other hand, the exploitability criterion was criticized by many governments which considered that it was necessary to set a limit to the coastal States' rights regarding the continental shelf.²³ Furthermore, the critics

20. R. Young, "The International Law Commission and the Continental Shelf", 46 AJIL (1952), pp. 123-128, at p. 124.

21. Loc. Cit., in note 19 (p. 27), at p. 385.

22. YBILC, 1953, Vol. I, p. 74, para.5.

23. They were: Belgium, Brazil, Egypt, France, Iceland, Israel, the Netherlands, Norway, United Kingdom and Yugoslavia. See YBILC, 1953, Vol. II, pp. 241-270.

of the exploitability criterion were not land-locked States but all were coastal States.²⁴

However, with regard to the Commission's views on the configuration of the continental shelf it must be admitted that if only a depth limit were adopted some coastal States would have a larger share while the others would have a smaller share. This inequality is not man-made but is due to millions of years of natural processes. The vagueness of the definition then adopted by the ILC would in time generate various understandings between States concerning interpretations of the exploitable area. The conflict among States would arise from their technological advances and political motives rather than the geological factors. Furthermore, the idea of allocating parts of the submarine areas to those coastal States which do not possess any continental shelf was by many considered most unrealistic and illogical.

At its Third Conference, in London in 1950, the International Bar Association examined the theory of compensation in relation to the continental shelf doctrine and stated that:

"This leads to a question of *justicia distributiva*. It may be hard on Switzerland that it has no sea coast to base a fishing industry upon, as well as it may be hard on Holland that it has no Alps to boost its tourist trade; does the lack of such natural assets in itself justify the consideration of compensatory measures...?"²⁵

24. Ibid.

25. See Report of the Committee on Coastal Waters and Appurtenant Subsoil, Third International Conference of the Legal Profession, International Bar Association, London 8 July 1950.

In defining the continental shelf the Commission also made a distinction between the submarine areas covered by the territorial waters and the submarine areas beyond the territorial waters assuming that coastal States already had the right to exercise sovereignty and thus exploit all the resources within their territory (including their territorial waters) and its submarine areas.²⁶ Thus arose a new aspect of the continental shelf doctrine - a legal definition which divided the submarine areas into zones unrelated to geological criteria.²⁷ This division had two disadvantages: first, perhaps it might encourage the coastal States to extend their territorial waters; and secondly, it was a long way from the purpose of adopting a formula which could create uniformity among coastal States concerning their claims to the continental shelf since there did not exist any agreement among States as to the exact limit of territorial waters.²⁸

26. For the rights of coastal States to their territorial waters see D.P. O'Connell, "The Juridical Nature of the Territorial Sea", 45 BYIL (1971) pp. 303-383.

27. See Franklin, Loc. Cit., in note 2 (p. 4), pp. 21-22.

28. According to Smith "A large number of States, including France, qualify their general acceptance of the three-mile limit by claiming certain extensions for varying purposes. Among the States claiming a wider minimum limit the following may be noted: Sweden (4 miles), Norway (4), Italy (6), Portugal (6), Mexico (9), Turkey (6), Yugoslavia (6), United Arab Republic (6), and Russia (12)". H.A. Smith, The Law and the Custom of the Sea, Third ed. 1958, at p. 23. According to FAO's survey in 1969, 28 States claimed 3 miles, 19 claimed from 4 to 10 miles, and 40 claimed 12 miles. See FAO Legislative Series No. 8, 1969. See also Lay et al, New Directions in the Law of the Sea, Op. Cit., in note 84 (p. 99), Vol. II, pp. 835-854.

Summing up the Commission's discussions and the conclusion it reached in adopting draft article 1 on the definition of the continental shelf it appears that:

a. The term continental shelf was not to have any geological significance; it was employed by the Commission only because it was in current use.²⁹

b. No conditions were to be laid down with regard to the proximity of the contiguous submarine areas.

c. The only limitation on the coastal States' rights to their respective contiguous submarine areas was to be their technological ability to overcome the depth of the superjacent waters.

Furthermore, the right of the coastal States as recognized by the Commission in draft article 2 was 'control and jurisdiction', but conditional on the actual exploration and exploitation of the natural resources of the contiguous submarine areas:

29. The Commission decided that the submarine areas concerned did not need necessarily to be the continuation of the land territory under the sea water. This was one of the conditions which had originally been inserted in the fourth paragraph of the United States Proclamation. Franklin notes that:
"From the standpoint of legal theory and prior doctrine this part of the Proclamation impliedly, though not expressly, suggests that proximity of the coastal state to the continental shelf is more conducive to 'effective occupation'. 'The continental shelf may be regarded as an extension of the land mass of the coastal nation and thus naturally appurtenant to it'. This statement of conditions as to the physical universe is geologically correct. It is unfortunate that the International Law Commission did not include this concept of the 'extension of the land mass' in its definition of the continental shelf in 1951, 1953 and 1956". Loc. Cit., in note 2 (p. 4), at p. 141.

"The continental shelf is subject to the exercise by the coastal States of control and jurisdiction for the purpose of exploring it and exploiting its natural resources".³⁰

The second article signified that if there were no exploration and exploitation of the contiguous seabed and subsoil there would be no right to exercise control and jurisdiction. In fact the First Commentary attached to draft article 2 made that condition quite clear by stating:

"In this article the Commission accepts the idea that the coastal State may exercise control and jurisdiction over the continental shelf, with the proviso that such control and jurisdiction shall be exercised solely for the purpose stated. The article exclude control and jurisdiction independently of the exploration and exploitation of the resources of the seabed and subsoil".³¹

It seems that in leaving the seabed and subsoil of the contiguous submarine areas to coastal States and to their technological capabilities to explore the shelf and exploit its natural resources the Commission did not take into consideration the possible interests of the land-locked States with regard to deep-sea resources. Moreover by limiting the right of control and jurisdiction to actual exploration and exploitation the Commission excluded the rights of coastal States the technological capabilities of which did not facilitate the exploration and the exploitation of the continental shelf and its natural resources.³²

30. YBILC, 1951, Vol. II, at p. 141.

31. Ibid., at p. 142

32. As explained in previous Chapter many coastal States had, by 1951, claimed sovereignty over the submarine areas and had not limited their claims to the natural resources of the areas claimed.

ii. The ILC Definition of the Continental Shelf: 1953

At its Fourth Session in 1952, the ILC studied Mr. François' Third Report on the Regime of the High Seas.³³ Meanwhile, having received the governments' comments on its 1951 draft articles on the continental shelf and related subjects, the Commission asked Mr. François to study the comments and submit a Fourth Report to the following Session³⁴ at which the Commission discussed both this Report and the comments of the various governments.³⁵

Although the 1951 definition of the continental shelf still had some support from a few of its members,³⁶ the Commission accepted those criticisms of the exploitability criterion made by governments and jurists and adopted the fixed limit of 200-metres by 7 votes to 4, with 2 abstentions.³⁷

The new draft article on the definition of the continental shelf now stated that:

"As used in these articles, the term "continental shelf" refers to the seabed and subsoil of the submarine areas contiguous to the coast, but outside the areas of the territorial sea, to a depth of two hundred metres".³⁸

33. UN. Doc. A/CN.4/ 51.

34. UN. Doc. A/SER.A/1952/Add. 1, Report of the ILC Doc. (A/2163) 4 June - 8 August 1952.

35. UN. Doc. A/CN.4/60.

36. YBILC, 1953, Vol. I, pp. 73-79.

37. Ibid., at p. 83, para. 52. This draft article had originally been proposed by Mr. François in his text, UN. Doc. A/CN.4/60.

38. YBILC, 1953, Vol. II, at p. 212.

The Commission yet again discussed the difference between the legal and geological meanings of the term continental shelf and finally decided that the term continental shelf was not to be construed in its geological sense.³⁹

In relation to the problems mentioned above regarding the shallow submarine areas contiguous to the coast and those contiguous submarine areas which are separated from the coast by deep troughs the Commission decided that those areas would be covered by the term continental shelf.⁴⁰

However, as far as the limit of the continental shelf was concerned, as was pointed out by Mr. Lauterpacht and by the Chairman of the Commission, the 200-metre depth limit was not purely an arbitrary definition since it coincided with the common geological concept of the average limit of the continental shelf.⁴¹

The right of coastal States regarding the exploration of the continental shelf and the exploitation of its natural resources as it had been adopted in draft article 2 of the 1951 draft articles was a right of control and jurisdiction. This right had been further limited to actual exploration and exploitation of the continental shelf and its natural resources. The governments of Chile, France, Iceland, the Union of South Africa and United Kingdom all

39. YBILC, 1953, Vol. I, pp. 66-79.

40. Ibid.

41. Ibid., at p. 82, paras. 44-45.

opposed this point and considered that the coastal States should exercise sovereignty over the continental shelf.⁴² Brazil and Denmark however considered that the right of control and jurisdiction vested in coastal States in draft article 2 should be 'exclusive'.⁴³

According to Mr. François:

"Those governments which believed that coastal States should exercise sovereignty over the continental shelf had argued that control and jurisdiction amounted to the same thing, the more so if the latter term were reinforced by the qualification 'exclusive'".⁴⁴

Consequently:

"Taking those observations into account, he had proposed that the original text be modified by the insertion of the words 'sovereign rights' before the words 'control and jurisdiction'.⁴⁵

The Commission spent four meetings (197th-200th) discussing all aspects of the nature of the rights to be vested in coastal States. No agreement was reached and finally, at its 215th meeting, a proposal by Mr. Spiropoulos was adopted which read as follows:

"The coastal State exercises over the continental shelf sovereign rights for the purpose of exploring and exploiting its natural resources".⁴⁶

During its discussions the Commission expressed the view that whatever the nature of the right it would relate

42. Ibid., p. 83, para. 56.

43. Ibid., para. 57.

44. Ibid.

45. Ibid., para. 58.

46. Ibid., at p. 202, para. 40.

only to the natural resources of the seabed and subsoil of the continental shelf and would not affect the legal status of the superjacent waters as high seas.

It was also proposed that the coastal States should exercise sovereignty over the seabed and subsoil of the continental shelf.⁴⁷ This proposal, although clear in meaning from the legal point of view, did not fulfil the function intended which was exploration and exploitation of the continental shelf and its natural resources by the coastal States.⁴⁸

Another legal point discussed by the Commission in relation to the use of the term sovereignty was whether or not sovereignty over the continental shelf can be restricted when the term 'sovereignty' is employed. It was argued by one member that:

"...the new article 2 as a whole did not in fact give sovereignty to the coastal States. It was clear from paragraph 2 that the coastal State was granted only limited rights and for a special purpose, namely, the exploration and exploitation of the natural resources of the continental shelf. Such limited powers could not be called sovereignty. The situation with regard to the continental shelf was quite different from that which arose when the sovereign powers over a territory were divided between different States. In the latter case, the words 'limited sovereignty' could be used, because the sovereign rights in the territory

47. Ibid., pp. 85-91.

48. It was asked by one of the members of the ILC: "...whether, if States were accorded full sovereignty over their continental shelf they would have the right to sell, cede or transfer the whole or any part of that area". Ibid., para. 72.

were envisaged as a whole. He did not understand, however, how it could be said that the continental shelf was subject to the sovereignty of the coastal State".⁴⁹

As well as the problem of providing protection for the freedom of the high seas another difficulty in choosing and adopting a proper term arose from the fact that no longer was the term 'natural resources' limited in meaning to 'mineral resources'. The question of other resources such as kelp and sedentary fisheries, which could not be considered as minerals but were equally important to many coastal States, had occasioned a remarkable argument among the Commission's members.⁵⁰

By using the term 'sovereign rights', the Commission considered that it had made it absolutely clear that it had limited the rights of coastal States over the continental shelf. It maintained the view that sovereignty could not be claimed because there was a substantial difference between sovereignty over the land and that over the continental shelf. The latter related closely to the freedom of the high seas and great precision was necessary to prevent infringement of that doctrine.

The Commission also considered the problem of whether islands generated continental shelf rights. It concluded in this respect that:

"The expression 'continental shelf' does not imply that it refers exclusively to continents in the current connotation of the term. It covers also the submarine areas contiguous to

49. Mr. Sandstrom, *ibid.*, pp. 198-199.

50. See below B.

islands".⁵¹

The Commission did not, however, provide any definition of 'island' in this context.

iii. The ILC Definition of the Continental Shelf: 1956

Although it seemed that the 200-metre depth limit adopted by the ILC in 1953 would, for the reasons discussed above, remain unchanged, the whole concept of the continental shelf was once more re-examined by the Commission in 1956.

This re-examination produced a few but fundamental changes in the new draft articles adopted by the Commission in 1956 which substantially differed from the previous draft articles.

Once again, it was discussed whether the term 'continental shelf' should be kept in article 1 or whether the term 'submarine areas' should be preferred. One of the factors causing doubt among the members of the ILC was that the right of exploitation of the natural resources of the continental shelf beyond the 200-metre depth had not been recognized by the Commission in 1953. In other words some considered that a coastal State could not exploit the natural resources which were situated beyond the 200-metre depth and were still within the continental shelf of that State.

In 1956, at its first meeting to discuss the definition of the continental shelf, Mr. Garcia Amador (the Chairman

51. YBILC, 1953, Vol. II, p. 214, para. 67.

of the ILC) put forward a proposal which read as follows:

"As used in thses articles, the expression 'submarine areas' refers to the soil and sub-soil of the submarine shelf, continental and insular terrace, or other submarine areas, adjacent to the coastal State outside the territorial sea, to a depth of 200 metres or, beyond that limit, to where the depth of the superjacent waters admits of the exploitation of the natural resources of the said areas".⁵²

This proposal contained two major changes from the draft of article 1 which had been adopted in 1953. The first included the use of the term 'submarine areas' instead of the term 'continental shelf'. The second was the introduction of a combined criterion based on the Commission's draft articles of 1951 and 1953, i.e. the 200 metres depth plus the exploitability criterion.

With regard to the first change the Commission did not agree to accept the change for the reasons it had discussed during its previous sessions.⁵³ With regard to the second change the proposal was altered by the Commission before it was put to the vote. The alteration consisted simply of the addition of the clause "or beyond that limit to where the depth of the superjacent waters admits of the exploitation of the said areas" at the end of the draft article 1 of 1953.⁵⁴

This definition which had already been adopted at the

52. YBILC, 1956, Vol. I, pp. 130-132, at p. 131, para. 44.

53. Ibid., pp. 132-135, and *ibid.*, pp. 136-139.

54. Ibid., p. 139, para. 45.

Inter-American Specialized Conference at Ciudad Trujillo,⁵⁵ was finally adopted by the Commission by 7 votes to 5, with 3 abstentions.⁵⁶

It had been argued that the outer edge of the continental shelf in some cases extended far beyond the 200 metres depth and therefore it was reasonable and just to grant coastal States the right to exploit the natural resources of the continental shelf beyond that limit.⁵⁷

Although this criticism is sound it does not justify the vagueness of the exploitability criterion as it stands in draft article 67. It would be reasonable and just if coastal States whose continental shelves extended beyond the 200-metre depth limit could, by virtue of the exploitability criterion, exercise the right to exploit their natural resources. In other words, if the exploitability criterion were used as a complementary clause, that is to say, if it operated from the 200 metres depth only where the continental shelf extended beyond that limit, its addition would be understandable. Since no condition to that effect was inserted it remained doubtful how coastal States would interpret the presence of this independent clause.

As Mr. Scelle of France pointed out:

"Adoption of the concept whereby the continental shelf extended as far as exploitation of the natural resources of the seabed was possible would tend to abolish the domain of the high

55. Final Act, Inter-American Specialized Conference (Ciudad Trujillo), 15-28 March 1956. P.A. Union, pp. 13-14.

seas".⁵⁸

The Chairman answered this criticism of the additional clause and said:

"...the words 'adjacent to the coastal State' in his proposal placed a very clear limitation on the submarine areas covered by the article. The adjacent areas ended at the point where the slope down to the ocean had begun, which was not more than 25 miles from the coast".⁵⁹

However, the implied limitation which was supposed to have laid down by the words 'adjacent to the coastal State' proved to be a mere assumption which obviously differed from coastal States' opinion on the matter.⁶⁰

56. YBILC, 1956, Vol. I, at p. 139, para. 45.

57. See R. Young, "The Legal Status of Submarine Areas Beneath the High Seas", 45 AJIL (1951), pp. 225-249, at p. 235.

58. YBILC, 1956, Vol. I, at p. 135, para. 89.

59. Ibid., para. 95.

60. See George Miron, Loc. Cit., in note 24 (p. 16), pp. 267-288.

B The ILC's Definition of Natural Resources

i. The ILC Definition of Natural Resources: 1950 and 1951

The exploitation of the seabed of the submarine areas within or beyond the generally accepted three mile territorial waters was limited to a few so-called sedentary species and in order to acquire any international recognition, coastal States had to have exploited such fisheries continuously and effectively for a long time.⁶¹

The exploitation of sedentary species, together with the exploitation of the subsoil of the submarine areas by means of tunnelling were regarded as exceptions to the rule of freedom of the high seas in international law.⁶²

It was not until 1945 that the term 'natural resources' in connection with the seabed and subsoil made its appearance in some national and international instruments and no attempt has been made to explain or clarify the meaning and scope of the term.⁶³ Yet neither the definition of the continental shelf nor the nature of the rights vested in coastal States can have any legal significance unless it is known precisely what resources are included in the meaning of 'natural resources'.

A main goal of the ILC in dealing with the question of the continental shelf was to preserve and protect the full freedom of the high seas.

61. See above pp. 20-60.

62. Ibid.

63. See above pp. 63-116.

The first important document referring to the seabed and subsoil of the submarine areas with regard to its resources other than sedentary species is the 1942 Treaty of the Gulf of Paria.⁶⁴ As described earlier, the Treaty allowed orderly exploration for petroleum and its exploitation in the submarine area of the Gulf of Paria and referred to the mineral resources of the submarine area while recognizing the freedom of the high seas.

In 1945, the term 'natural resources' appeared for the first time at the general international level in the United States Proclamation on the Continental Shelf and was subsequently used by most coastal States which claimed continental shelf rights.⁶⁵ The first paragraph of the United States Proclamation explained the purpose of the claim by referring to the world-wide need for petroleum and other resources of the continental shelf, and like the Treaty of the Gulf of Paria, explicitly referred to the legal status of the superjacent waters of the continental shelf as remaining unaffected by the claim.

Whether or not the use of the term 'natural resources' in the Proclamation was meant or intended to include any resources other than petroleum and other minerals, is not clear. On the other hand, on the same day as the Proclamation on the Continental Shelf, the United States issued

64. UNLS, Laws and Regulations on the Regime of the High Seas, 1951, pp. 44-47. See above pp. 70-71.

65. See above pp. 72-86.

another Proclamation entitled "Policy of the United States with Respect to Coastal Fisheries in Certain Areas of the High Seas" in which it referred to the protection and conservation of the fishing resources in certain unidentified areas of the high seas. Neither of the two Proclamations made any reference to sedentary fisheries.⁶⁶

At its second Session in 1950, the ILC, while examining the "Regime of the High Seas" discussed the question of sedentary fisheries.⁶⁷ Mr. François' First Report on this issue stated:

"It should, however, be noted that many sedentary fisheries have never given rise to objection by other States. Hence it may be concluded that, in so far as sedentary fisheries are concerned, the international community accepts within certain limits this derogation from the principle of the freedom of the sea in specific portions of the sea situated outside territorial waters but close to the coast".⁶⁸

During the 1950 Session, the Commission did not decide whether or not the question of sedentary fisheries should be dealt with in connection with the continental shelf since the right to exploit those fisheries had been recognized in international law on the basis of immemorial possession. In 1951, however, the Commission decided to discuss the question of sedentary fisheries independently of the continen-

66. Proclamation No. 2668, Sept. 28, 1945, 10 Fed. Reg. 12304.

67. YBILC, 1950, Vol. I, pp. 208-211.

68. Ibid., p. 211, para. 32.

tal shelf and considered them as resources of the high seas.⁶⁹

As discussed earlier, article 2 of the 1951 draft articles on the continental shelf referred to the 'natural resources' of the continental shelf. The Commission did not clarify what it meant by this term and there was no description of the term 'natural resources' in its Commentary on draft article 2.⁷⁰

The Commission was asked by one of its members "whether 'natural resources' meant anything other than the mineral resources".⁷¹ It was stated by another member that "...in his Proclamation of 28 September 1945, President Truman had had in mind only 'mineral resources', petroleum in particular".⁷² This remark was also supported by Mr. François who stated that:

"...President Truman in his Proclamation had referred to 'natural resources', but that the preamble referred only to 'mineral resources'".⁷³

Mr. Hudson, one of the members, argued that "...the interpretation of the term 'natural resources' should not be restricted so narrowly - kelp gathering for example was an industry of some importance in parts of France and Ireland".⁷⁴

The Commission "decided to postpone for the time

69. YBILC, 1951, Vol. I, p. 317, para. 83.

70. YBILC, 1951, Vol. II, pp. 141-142.

71. Mr. Sandstrom, YBILC, 1951, Vol. I, p. 276, para. 46.

72. Mr. Yepes, *ibid.*, para. 48.

73. *Ibid.*, p. 277, para. 53.

74. *Ibid.*, para. 47.

being consideration of the question whether the word 'mineral' should be substituted for 'natural' in article 2".⁷⁵

In its first Commentary on draft article 3 on Sedentary Fisheries the Commission made it clear that the exploitation of the continental shelf related to mineral resources and observed that:

"The proposals relating to the continental shelf are concerned with the exploitation of the mineral resources of the subsoil".⁷⁶

There appears to be a contradiction between the above comment and the Commission's draft articles 1 and 2 on the continental shelf. The above comment refers only to the exploitation of mineral resources of the subsoil while draft article 1 referred to the natural resources of the seabed and subsoil and draft article 2 referred to the natural resources of the continental shelf. Since it had dealt with the question of sedentary fisheries in a separate article and had recognized the freedom of fishing, navigation and the laying of submarine cables in accordance with the freedom of the high seas (in draft articles 3,4,5 and 6 on the continental shelf and draft article 3 on Related Subjects) the Commission did not think that the use of the term natural resources would create any problem.

Sedentary Fisheries

In 1951, the Commission followed the views concerning sedentary fisheries that it had expressed in 1950 i.e.

75. Ibid., p. 277, para. 57.

76. YBILC, 1951, Vol. II, at p. 143.

sedentary fisheries were resources of the high seas; their exploitation had long been practised by some States and a clear legal concept had been established in international law.⁷⁷ However, having acknowledged that the legal status of sedentary fisheries was an exception to the freedom of the high seas the question next arose whether or not these resources should now be regulated under the continental shelf regime.⁷⁸ The Chairman suggested that "...the Commission would decide that the question of sedentary fisheries was independent of the continental shelf and that there was no reason to modify existing practice with regard to such fisheries".⁷⁹ Mr. Yepes challenged this view and argued that he did not consider that the two questions could be separated. He suggested that "in approving the principle of the continental shelf, the Commission had at the same time implicitly approved the principle of sedentary fisheries". He then concluded his argument by stating that:

"If it were desired to apply the general rule of law the accessory followed the principal, it must be admitted that sedentary fisheries and submarine vegetation formed an integral part of the continental shelf. That being so, if a coastal State were empowered to regulate the continental shelf, it should also be made responsible for the regulation of sedentary fisheries".⁸⁰

The Commission finally decided to deal with sedentary fisheries independently of the continental shelf on grounds which were well defined by one of its members who asked:

77. YBILC, 1951, Vol. I, at p. 317, paras. 77-83.

78. Ibid., at p. 316, para. 66.

79. Ibid., para. 69.

80. Ibid., para. 70.

"...why the Commission should try to include new provisions into the regime of sedentary fisheries, which was based on a peaceful, stable and lasting tradition? From time immemorial such fisheries had operated under the benevolent supervision of States, without ever having caused any conflict".⁸¹

The Commission therefore voted in favour of dealing with the question of sedentary fisheries independently of the continental shelf.⁸²

The definition upon which the Commission proceeded to regulate sedentary fisheries was the one Professor Gidel had introduced and Mr. François had included into his report which read as follows:

"Fisheries may be described as sedentary either by reason of the species with which they are concerned, that is to say species attached to the soil or irregular surface of the seabed, or by reason of the equipment used, for example stakes into the seabed".⁸³

This definition was interpreted in its narrowest scope by the Commission and during discussions it became quite clear that what was understood by sedentary fisheries was mainly pearl fisheries. No mention was made of sedentary fisheries as a food resource. Nor was the question of the vegetation of the seabed discussed.⁸⁴

Draft article 3 on Resources of the High Seas entitled "Sedentary Fisheries" which was finally adopted by the

81. Ibid., p. 317, para. 77.

82. Ibid., para. 83.

83. Ibid., p. 320, para. 3.

84. For full discussion on the exploitation of sedentary fisheries and benthic plants see below Chapter V.

Commission in 1951 stated:

"The regulation of sedentary fisheries may be undertaken by a State in areas of the high seas contiguous to its territorial waters, where such fisheries have long been maintained and conducted by nationals of that State, provided that non-nationals are permitted to participate in the fishing activities on an equal footing with nationals. Such regulation will however, not affect the general status of the areas as high seas".⁸⁵

The only right recognized in this article was that of coastal States to undertake the regulation of sedentary fisheries. This right cannot be exercised unless "such fisheries have long been maintained and conducted" by nationals of coastal States. This means that coastal States whose nationals have not maintained and conducted such fisheries cannot undertake the regulation of such fisheries. Furthermore, non-nationals must, in any case, enjoy such fisheries on an equal footing with nationals.

A question arises here concerning the right to promulgate conservation measures if the nationals of a coastal State have not been engaged for long enough in the fishing of such species and those species are being over-exploited by nationals of other States.

Consideration of draft article 3 reveals that it was adopted in absolute ignorance of the facts concerning sedentary fisheries.⁸⁶ Moreover, it was contrary to customary international law and did not reflect long standing custom in any way. It was stated earlier that customary

85. YBILC, 1951, Vol. II, at p. 143.

86. See below Chapter V.

international law recognized the exclusive right of coastal States with regard to their sedentary fisheries either by occupation or prescription.⁸⁷ Sedentary species such as pearl, chank, coral and sponges had been regulated and their rights effectively enforced by some coastal States including Ceylon, Italy, Tunisia, Panama and Venezuela.⁸⁸ Those States had claimed exclusive rights or sovereignty over sedentary fisheries outside their territorial waters and none had recognized the rights of non-nationals on an equal footing with nationals.

ii. The ILC Definition of Natural Resources: 1953

As was described at the beginning of this Section, the term 'natural resources' in articles 1 and 2 of the 1951 draft articles on the Continental Shelf was obscure and ambiguous, and the Commission made no attempt to clarify the meaning of the term either in the articles or in its Commentaries on the articles.

Article 3 on Related Subjects provided regulation of the sedentary fisheries which totally ignored both customary international law and the interests of coastal States concerning those fisheries.

The Commission therefore had adopted two separate regimes regarding the resources of the continental shelf: in the first regime it had given coastal States exclusive rights of control and jurisdiction over the 'natural resources' of the continental shelf; and having secured the

87. See above pp. 39-45.

88. See above pp. 45-58.

freedom of fishing and navigation in the superjacent waters it had introduced a new regime for the regulation of the sedentary fisheries by excluding them from the definition of 'natural resources' of the continental shelf. The new regime relating to the exploitation of sedentary fisheries did not give or recognize, under any circumstances, any preferential right of the coastal States. Furthermore, by comparison, coastal States were granted more power to regulate the fish resources in areas of the high seas adjacent to their coasts than they were under article 3 on sedentary fisheries of the continental shelf.⁸⁹

In 1953 the Commission considered whether the term 'natural resources' which had been adopted at its previous session should be retained or whether it should be replaced by the term 'mineral resources'. The main question discussed in relation to the change of the term from 'natural' to 'mineral' was that of sedentary fisheries.⁹⁰

Professor Lauterpacht was of the opinion that both mineral and non-mineral resources should be under the same regime and he did not see any good reason to treat them separately. In support of his view he pointed out to the Commission that:

"There were two reasons for allowing the coastal State exclusive rights of exploration and exploitation over its continental shelf. In the first place, it would be more convenient in practice for the coastal State to engage in such activities.

89. See article 1 on the Related Subjects. YBILC, 1951, Vol. I, p. 143, see also the Commentaries, *ibid*.

90. YBILC, 1953, Vol. I, pp. 135-136.

Secondly, it would not be desirable to permit other States to engage in such activities close to the coastal State's shore. Both those considerations applied with as much force to the exploration and exploitation of non-mineral resources as that of mineral resources".⁹¹

He then proposed that:

"The term natural resources be used, it being made clear, either in the text or in the commentary, that 'natural resources' did not include swimming fish or bottom fish".⁹²

After a short discussion, this proposal was adopted by the Commission.⁹³

The Commission returned to the question of the regulation of the sedentary fisheries when it came to deal with articles on the Related Subjects.⁹⁴ Although it seemed clear that by adopting the term 'natural resources' the Commission had recognized coastal States' sovereign rights over the sedentary fisheries some members expressed anxiety over two major questions concerning the exploitation of the sedentary fisheries. The first concerned the accommodation of the rights of non-nationals who had for many years maintained and conducted the exploitation of the sedentary fisheries in the continental shelf, exploitation of which would otherwise be within the sovereign rights of the coastal States. The second question concerned the area in which coastal States were granted sovereign rights over the sedentary fisheries. The first problem was

91. Ibid.

92. Ibid., para. 71.

93. This proposal was adopted by 6 votes to 4, with 3 abstentions, *ibid.*, para. 79.

94. Ibid., pp. 144-149.

described by Mr. François who said:

"The Commission had taken the view that a coastal State could regulate sedentary fisheries on the continental shelf if it possessed historic rights thereto. Rights over the continental shelf allowed only for the exploitation and exploration of mineral resources, and sedentary fisheries were not mineral resources. In the light of the Commission's decision, the argument might perhaps be stated thus: the sovereign rights of a State over the continental shelf and its exclusive right to exploit the natural resources thereof could be interpreted as granting that State the exclusive right to exploit sedentary fisheries except in so far as another State or States possessed historic rights to those fisheries".⁹⁵

He concluded his argument by stating that:

"...the question was far from academic. For instance, Australia was opening up new pearl fisheries in its continental shelf. Could it reserve these fisheries to its nationals and prevent the Japanese from exploiting them?".⁹⁶

This question, as understood by some members, would mean that the Commission had either to reverse its decision on the sovereign rights of the coastal State over the natural resources of the continental shelf by restricting their application to sedentary fisheries which were not subject to such historic rights, or to modify and redraft article 3 on the resources of the high seas which had been adopted at its Third Session.⁹⁷

The Commission was not in favour of reversing its decision on an article it had already adopted, although it felt that in cases where such historic rights existed they

95. Ibid., paras. 9 and 10.

96. Ibid., para. 10. See also the comment of the United Kingdom on article 3 "regulation of the sedentary fisheries", YBILC, 1953, Vol. II, pp. 267-268.

97. YBILC, 1953, Vol. I, p. 145, paras. 12-15

should be protected.⁹⁸ Some members, on the other hand, thought that the sovereign rights of coastal States over the natural resources of the continental shelf should not be restricted at all. Mr. Alfaro, for instance, referred to the Gulf of Panama which is almost entirely shallow and pointed out that:

"In the past his country had possessed a fine mother-of-pearl industry and pearl fisheries which had been completely destroyed by foreign fishermen".⁹⁹

He then argued that even if an article on sedentary fisheries were adopted it should "ensure the enjoyment by the coastal State of control over sedentary fisheries situated in the continental shelf".¹⁰⁰

The second problem, as mentioned above, was the question of the area in which a coastal State could exercise its sovereign rights over sedentary fisheries. In article 3 on the regulation of sedentary fisheries the Commission had defined the area as "...areas of the high seas contiguous to its territorial waters...".¹⁰¹ Now that the Commission had already recognized the sovereign rights of the coastal States over the natural resources of the continental shelf up to a 200-metre depth the question regarding the regulation of the sedentary fisheries beyond that limit still remained to be decided. Thus the Commission had two

98. Ibid., pp. 147-148, paras. 43-49.

99. Ibid., para. 16.

100. Ibid.

101. Art. 3 on the Resources of the High Seas, related subjects, YBILC, 1951, Vol. I, at p. 143.

aims in drafting a new article 3 on the "Resources of the High Seas": first, it had to clarify the legal question of historic rights in relation to the sovereign rights of the coastal States over sedentary fisheries; and secondly, it had to decide the question of regulation of such fisheries beyond the 200 metre depth.

The Commission therefore decided to consider new proposals on the regulation of sedentary fisheries and the first proposal which was suggested by Mr. François read as follows:

"The regulation of sedentary fisheries in areas of the high seas may be undertaken by a State either on its continental shelf or in other areas where such fisheries have long been maintained and conducted by nationals of that State. In both cases, the rights acquired by nationals of other States must be protected".¹⁰²

This proposal was strongly criticised by some members who did not agree that historic rights were equivalent to the 'acquired rights' referred to in this proposal. As was pointed out by one of the members the expression 'acquired rights' was not appropriate and he wondered "... how were the rights acquired, and by whom?. If by individuals, as seemed to be implied, was it to be taken that they lapsed with the death of those individuals".¹⁰³ Mr. Alfaro, supporting the above criticism and the legal inaccuracy of the term 'acquired rights', said that he "...recalled that the classic definition of an acquired right was 'a

102. YBILC, 1953, Vol. I, at p. 148, para. 49.

103. Ibid., para. 52. The question was raised by Mr. Spiropoulos. Ibid.

right legally and duly acquired by a person in accordance with the law existing at the time the right had been acquired'. It was, therefore, very difficult to see how the term could be applied in international law not by States, but by persons in respect of which it was impossible to say what the international law in force at a certain time and at what time the right was acquired".¹⁰⁴ And he further commented that:

"It was also not sufficient to refer to 'the regulation' of sedentary fisheries. It must be made clear whether or not such regulation extended to the right to exclude the nationals of certain States".¹⁰⁵

Mr. Yepes agreed with the points already mentioned but noted that the coastal States should not be given the right to regulate sedentary fisheries beyond the continental shelf. He then proposed that the new text proposed by Mr. François should be amended to read:

"The regulation of the sedentary fisheries established in the high seas included in the continental shelf shall be undertaken by the coastal State itself".¹⁰⁶

This amendment was rejected by the Commission and although the first sentence of the new proposal was adopted, the second sentence was rejected,¹⁰⁷ and eventually the proposal as a whole was rejected.¹⁰⁸ Further proposals by other members were also rejected until finally there were

104. Ibid., para. 53.

105. Ibid., para. 54. See also *ibid.*, paras. 56 and 58.

106. Ibid., at p. 149, para. 60.

107. Ibid., at p. 151, para. 11.

108. Ibid., para. 14.

no proposals left to be discussed by the Commission concerning the regulation of sedentary fisheries.¹⁰⁹

At its following meeting during discussion of articles 1 and 2 on the resources of the high seas (related subjects) Mr. François proposed a new article on the regulation of sedentary fisheries which immediately gave rise to arguments among the members.¹¹⁰ Mr. Spiropoulos, reminded the Chairman that the question on the regulation of sedentary fisheries had been closed at the previous meeting and urged that:

"...before considering any new proposals on that question at the present session, therefore, it (the Commission) must, under its rules of procedure, decide that it wished to reopen the subject. He therefore requested that, before allowing the discussion to proceed, the Chairman should ascertain whether that was in fact the Commission's wish".¹¹¹

The Commission decided by 6 votes to 4, with 4 abstentions, that it did not wish to re-open the discussion on sedentary fisheries.¹¹²

Although the Commission did not adopt an article on the regulation of the sedentary fisheries its Commentary on draft article 2 of the continental shelf made it clear that it intended to protect the historic rights of non-nationals over sedentary fisheries.

Before examining the Commission's Commentary on these

109. Ibid., paras. 21 and 34.

110. Ibid., pp. 156-157, para. 1-13.

111. Ibid., para. 15.

112. Ibid., para. 16.

points on which it had failed to reach any agreement, it is appropriate to ascertain whether the Commentary refers to any definition of sedentary fisheries. The Commission did not in fact provide a clear definition of what can be classified as sedentary fisheries. It referred only to the sedentary fisheries as being those permanently attached to the seabed as the following remarks reveal:

"The Commission, however, came to the conclusion that the products of sedentary fisheries, in particular to the extent that they were natural resources permanently attached to the bed of the sea, should not be outside the scope of the regime adopted and that this aim could be achieved by using the term 'natural resources'".¹¹³

The criterion of permanent attachment to the bed of the sea would clearly exclude almost all species of crustacea as well as some species of mollusc.¹¹⁴ Furthermore, it is highly unlikely that any species can be found which passes its entire life cycle affixed to the seabed.

The Commentary went on to describe what species were not included within the sovereign rights of coastal States:

"It is clearly understood, however, that the rights in question do not cover so-called bottom-fish and other fish which, although living in the sea, occasionally have their habitat at the bottom of the sea or are bred there".¹¹⁵

The meaning of this remark is not at all clear. It does not specify whether it refers to demersal fish, some of which species live and breed habitually on the rocks, muds,

113. YBILC, 1953, Vol. II, at p. 214, para. 70.

114. See below Chapter V.

115. YBILC, 1953, Vol. II, p. 214, para. 70.

sand and seaweeds of the continental shelf, or to sedentary species other than those which are permanently attached to the seabed.

The regulation of sedentary fisheries beyond the 200 metre depth on which the Commission had not decided during its discussion was referred to in its Commentary as follows:

"The Commission envisaged the possibility that shallow areas rendering possible the exploitation of sedentary fisheries may exist outside the continental shelf. However, that possibility was considered to be too theoretical to necessitate separate treatment".¹¹⁶

It was, however, the view of the majority of the members of the Commission that coastal States should not have "any sovereign rights beyond the continental shelf" and since there did not exist any major exploitation of sedentary fisheries beyond the 200 metre depth it did not seem important to adopt any regime regarding those fisheries.¹¹⁷

Historic Rights

The protection of the 'historic rights' of non-nationals regarding the exploitation of sedentary fisheries on the continental shelf of coastal States caused the most controversy and argument in the Commission's Commentary as it stood. The Commentary, after having excluded the sovereign rights of coastal States over species which are not permanently attached to the seabed and over the so-called bottom-fish, stated that:

116. Ibid., at p. 214, para. 71.

117. Ibid.

"Neither, in the view of the Commission, can the exclusive rights of the coastal States be exercised in a manner inconsistent with existing rights of nationals of other States with regard to sedentary fisheries. Any interference with such rights, when unavoidably necessitated by the requirements of exploration and exploitation of natural resources, is subject to rules of international law ensuring respect of the rights of aliens. However apart from the case of such existing rights, the sovereign rights the coastal State over its continental shelf cover also sedentary fisheries".¹¹⁸

It is very important to note the significance of the expression "existing rights of nationals of other States" in the Commentary. The Commission avoided the use of any terms which would contradict the existing rules and customs of international law with regard to sedentary fisheries. It did not use the term 'historic rights' because that would involve States whose rights fell into one of the two categories of prescription and occupation. Both those concepts were related to acquisition of title by means of exercising sovereignty and since all areas beyond the territorial waters had been regarded in international law as high seas (whether regarded as *res nullius* or *res communis*) States could not acquire historic titles over them.¹¹⁹ Only from the beginning of this century have some references been made to historic rights over sedentary fisheries outside territorial waters and those references were made in relation to the rights of coastal States over their sedentary fisheries.¹²⁰ The historic rights of

118. Ibid.

119. See above pp. 38-39.

120. See below Chapter VIII (B) (i).

States, other than coastal States, over the sedentary fisheries, outside the territorial waters has no basis in international law.¹²¹

The Commission also avoided using the term "rights acquired by nationals of other States" which had been suggested by Mr. François at its 207th meeting for the reasons mentioned earlier.¹²²

The important point is that there was no definition of what constituted "existing rights" or of how long they had to have been exercised in order to be recognized as such. Furthermore, there was no provision in the Commentary regarding the regulation of sedentary fisheries in areas of the continental shelf where such rights exist. Any act by coastal States related to the exploration and exploitation of the natural resources could be considered as an "interference" with the "existing rights" of non-nationals.

Another difficulty presented by the Commentary is the lack of biological considerations of the unity of any given area of the continental shelf. In any given area, in any continental shelf, there is a variety of species of sedentary fisheries which are so interrelated ecologically that the exploitation of one affects not only the exploitation of others but also affects the whole area as an ecosystem. If by virtue of "existing rights" nationals of a

121. See above pp. 45-58, O'Connell, Loc. Cit, in note 45 (p. 38), at p. 195.

122. See above pp. 153-154.

State are engaged in pearl fishing and the coastal State wants to exploit its sponge fisheries or its kelp in the same area that would give rise to a conflict which according to the Commentary is an "interference" by the coastal State and therefore "subject to rules of international law ensuring respect of the rights of alien". Moreover, if a coastal State interferes even "unavoidably" with the "existing rights" of other nationals for the purpose of exploration of the continental shelf or exploitation of its natural resources, this interference is also "subject to rules of international law".¹²³

It is somewhat strange that the Commission did not recognize (as permissible) even "unavoidable" interference with such rights, while it did recognize (as permissible) "justifiable" interference by coastal States as far as navigation and fishing are concerned. Article 6 (1) of the 1953 draft articles on the continental shelf stated:

"The exploration of the continental shelf and the exploitation of its natural resources must not result in any unjustifiable interference with navigation, fishing or fish product".¹²⁴

123. YBILC, 1953, Vol. II, p. 214, para. 71.

124. Ibid., at p. 213.

iii. The ILC Definition of Natural Resources: 1956

Introduction

Between 1953, when the ILC concluded its second set of draft articles on the continental shelf, and the 8th Session in 1956 when it discussed and prepared its final draft articles, the question of the natural resources of the continental shelf was studied by experts in various conferences. The result of those studies included, inter alia, the importance of the consideration of biological, geological and socio-economic aspects of the exploitation of the natural resources in any juridical regime. Both the definition and the concept of the continental shelf and its natural resources were among the related subjects of the Law of the Sea studied in the following conferences:

1. Rome Conference: 1955

This Conference was held by the Food and Agriculture Organisation of the United Nations in Rome.¹²⁵ It included a group of experts who examined the problems concerning the technical and scientific aspects of the conservation of the living resources of the sea. The Conference, which is also known as the International Technical Conference on the Conservation of the Living Resources of the Sea, was basically concerned with the question of fishery resources and their conservation and therefore did not attempt to define the term 'natural resources'; neither did it take any account of the problem of sedentary fisheries including

125. The Conference was held from April 18 to May 10, 1955, UN. Doc. No. A/CONF. 10/7, 1955.

crustacea and mollusc. It provided, however, a comprehensive statement of the scientific information necessary for conservation measures. The second item in the agenda approved by the experts included:

- " a. Extent of separation of the fishery resources into independent or semi-independent populations.
- b. Magnitude and geographical range of the populations constituting the resources.
- c. Pertinent facts respecting the life history (such as growth, mortality, migration, recruitment), ecology and behaviour of the species constituting the resources.
- d. Effect of intensity and kind of exploitation on the resources.
- e. Relationships of the resources to other species being exploited simultaneously".¹²⁶

Furthermore, it was approved that coastal States had special interests in the maintenance of the productivity of the living resources of the high seas adjacent to their coasts.¹²⁷

2. Inter-American Council of Jurists: 1956

The Third Meeting of the Inter-American Council of Jurists held at Mexico City in 1956 adopted a series of articles on the continental shelf and its natural resources.¹²⁸ Article 8 on the continental shelf stated that:

"The rights of the coastal States, with respect to the seabed and subsoil of its continental shelf extend also to the natural resources found there, such as petroleum, hydrocarbons, mineral substances, and all marine and vegetable species that live in a constant physical and biological relationship with the shelf, not

126. UN. Doc. A/CONF. 10/6, 1955. See also *ibid*, pp. 14-23 and pp. 81-82.

127. UN. Doc. A/CONF. 10/5, Rev. 2, pp. 6-7.

128. Inter-American Council of Jurists, Acts and Documents of the Third Meeting, Pan-American Union, Washington D.C. 1956.

excluding the benthonic species".¹²⁹

3. The Inter-American Specialized Conference: 1956

The Inter-American Specialized Conference held at Ciudad Trujillo in 1956 also discussed the question of the "Conservation of Natural Resources: The Continental Shelf and Marine Waters".¹³⁰ The declaration issued at the of the Ciudad Trujillo Conference revealed that the members had reached agreement only on one point; namely coastal States' special interests in the continued productivity of the living resources of the high seas adjacent to their coasts.¹³¹ With regard to the conservation and the definition of the natural resources of the continental shelf it was declared that:

"2. Agreement does not exist among the States here represented with respect to the juridical regime of the waters which cover the said submarine areas, nor with respect to the problem of whether certain resources belong to the seabed or to the superjacent waters.

... ..

6. Agreement does not exist among the States represented at this Conference either with respect to the nature and scope of the special interests of the coastal States, or as to how the economic and social factors which such States or other interested States may invoke should be taken into account in evaluating the purposes of conservation programmes".¹³²

The results of the aforesaid Conferences affected the work of the Commission in 1956 to the extent that not only

129. Ibid., Final Act of the Third Meeting at p. 433. For a description of benthic species see below Chapter V.

130. Inter-American Specialized Conference held at Ciudad Trujillo 15-28 March 1956, Pan American Union, pp. 1-11.

131. Ibid.

132. Ibid., pp. 13-14.

was the definition of the continental shelf changed but the concept of the natural resources became wider and more complicated than it had been in 1951 and 1953. The living resources of the continental shelf could not be limited to a few species of sedentary fisheries. The questions of shell fish as a food resource on the one hand, and their close biological relationship to the shelf on the other, prompted some coastal States as well as marine scientists and international jurists to take a special interest in the development of the juridical regime concerning the exploitation of the natural resources of the continental shelf.

Moreover, the exploitation of the mineral resources of the continental shelf was not an immediate prospect for most coastal States; it depended on the existence of the shelf, the presence of the minerals and the necessary technological ability and therefore their immediate interests were concentrated on the living resources.

The ILC Definition of Natural Resources: 1956

In 1956, the ILC discussed for the first time the possibility of adopting an article on the definition of the natural resources of the continental shelf.

The first definition was suggested by the Chairman, Mr. Garcia Amador, as part of his proposal for the definition of the continental shelf. The second paragraph of his proposal read as follows:

- "2. .. as used in these articles, the expression 'natural resources' refers to the mineral riches of the soil and subsoil of

the submarine areas, as well as to the living resources which are permanently attached to the bottom".¹³³

As mentioned earlier, the Commission had failed in 1953 to reach any agreement in adopting an article on the definition of natural resources. Only in the Commentary had it referred to the natural resources as including mineral substances and living resources which were permanently attached to the seabed and subsoil of the continental shelf. The only difference between the Chairman's proposal and the Commission's Commentary was that the former was suggested as a part of an article.

At the following meeting Mr. Padilla-Nervo, discussing the Chairman's proposal, stated that:

"...at its fifth session the Commission had decided that the products of sedentary fisheries should be included in the system of the continental shelf, it being understood that so-called bottom fish were excluded (A/2456, paragraph 70). The Chairman's proposal that the expression 'natural resources' should refer solely to the living resources permanently attached to the bottom was an excessive restriction of the concept of natural resources of the continental shelf, for it excluded many species properly belonging thereto and moreover, seemed to be even more limited in scope than the definition adopted by the Commission. The Commission had certainly had in mind the important doctrinal evolution that had taken place in the concept of sedentary fisheries, in accordance with which the right of the coastal State over certain species that could not always be regarded scientifically as permanently attached to the bottom, had been recognised. Apart from that question, however, it was essential that the Commission's approach to the problem should be based on modern, scientific criteria".¹³⁴

133. YBILC, 1956, Vol. I, pp. 130-131, at p. 31, para. 44.

134. Ibid., pp. 141-142, para. 84.

He then proceeded to give an account of the biological factors related to the question of the living resources of the continental shelf and drew attention to the following facts:

"The living resources of the continental shelf fall into three ecological groups. First, the sessile species permanently attached to the bottom such as algae, sponges, oysters etc; secondly, the sedentary species which lived on the bottom and had limited powers of movement such as crabs, lobsters, clams and the like; and thirdly, organisms which, although moving through the water at certain stages of their life, were not fish proper and depended on the products of the seabed for nourishment and shelter and included the majority of the shell fish.

Even the large majority of the sessile or sedentary species, during their life cycle, passed through a mobile stage. Oysters, coral, pearl oysters, crabs etc had mobile embryos which formed part of the plankton before passing on to the sessile or sedentary stage.

The criterion of permanent attachment to the bottom, therefore, was not valid in the determination whether a species was to be regarded as belonging to the living resources of the continental shelf, since if it was applied, no living species could be considered as belonging to the shelf. In the life of the modern fauna of the continental shelf there was an intimate physical and biological relationship between them and the shelf which was essentially the same for sessile and sedentary species. Every living organism needed a physical basis or substratum to its existence, whether it was solid, liquid or gas, and that substratum, in the case of sessile and sedentary species, was the bed of the continental shelf, which had a direct influence upon its marine population. That influence was reciprocal, for those organisms affected the ecological conditions of the shelf through the normal biological processes of life and death. There was, therefore, no major distinction to be drawn between the sessile and sedentary organisms.

The relationship between the fauna inhabiting the bed of the continental shelf was characterised by three features. In the first place, the

shelf represented the substratum for the benthonic species, providing them with a favourable environment for their existence and reproduction. Secondly, there was the reciprocal influence, with two-fold results, between the benthos and the shelf. Thirdly, the immobility of the sessile was merely one of the features derived from their relationship with the shelf, but it was neither the only one nor the major one.

Given that biological situation, the conclusion was inescapable that the majority of the benthonic species and the continental shelf should both be governed by the same juridical system. Since the sovereignty of the coastal State over the continental shelf was already a recognised juridical situation, it followed that the sessile and sedentary marine fauna should be incorporated in the system".¹³⁵

Mr. Padilla-Nervo's definition of the living resources of the continental shelf which gave the coastal States sovereign rights was based on the following criteria:

"The marine animal and vegetable species which live in a constant physical and biological relationship with the bed of the continental shelf".¹³⁶

He thus concluded his observation by stating that:

"There were two alternatives before the Commission: it could either embark on a detailed technical analysis of the problem or it could adopt the draft article as it stood, leaving consideration of the scientific aspects of the question to the experts in the General Assembly or to a special international conference, to be convened in order to deal with the whole subject".¹³⁷

The points raised by Mr. Padilla-Nervo were discussed by the Commission at its following meeting. Mr. Edmonds in

135. Ibid., paras. 85-90.

136. Ibid., para. 93.

137. Ibid., para. 94.

supporting the Chairman's proposal, referred to the biological aspects of the living resources of the continental shelf and stated that:

"Despite the fact that those attached species draw their nourishment from the surrounding water and might also be pelagic during part of their lifetime, their fixed position during the stage when they were in commercial utilization led to practical conservation problems justifying their being regarded as a special case.

Another practical problem calling for close consideration was that since, as Mr. Padilla-Nervo had stated, there was no interruption in the gradual transition of characteristics of the various forms from the firmly attached species to the free swimming fish of the high seas, it was essential, if the Commission were to decide that some species should be regarded as resources of the shelf, to establish a practical distinction between such species and those species which remained resources of the sea. Omission to do so would merely promote further controversy. The distinction between attached and unattached species provided a clear cut line of demarcation with both conservation and practical requirements. If that distinction were not made, the entire situation might easily become unmanageable".¹³⁸

Sir Gerald Fitzmaurice, while supporting Mr. Edmonds' points, considered that the definition of the natural resources as suggested and discussed by Mr. Padilla-Nervo went too far and that he (Mr. Padilla-Nervo):

"...seemed to favour a definition which would bring under the heading of the natural resources of the seabed any living creature in a constant physical and biological relationship with the continental shelf".¹³⁹

The Commission did not dispute that there existed a

138. Ibid., at p. 143, paras. 2-9.

139. Ibid., at p. 144, para. 13.

close biological relationship between the living resources of the continental shelf and the shelf itself. But the extent to which this relationship should or could be applied in order to form a basis for a legal regime was considered to be somewhat arguable. The Commission had no desire to cause or create a restriction on the freedom of fishing, including fishing for those species which were not fish proper, but were regarded as resources of the high seas and had come within that freedom. Although none of the members of the ILC was in any doubt over the importance of the freedom of the high seas some were in complete agreement with Mr. Padilla-Nervo's view that the definition of the natural resources was a scientific one and, therefore, should be left to scientists.¹⁴⁰ At this point Mr. Garcia Amado stated that:

"The essential purpose of the articles was to define the rights of the coastal State in respect of the continental shelf. In granting such rights it was essential to indicate the resources to which they extended. No major difficulty had been encountered at the fifth session with regard to the definition of sedentary fisheries or those organisms permanently attached to the bottom. There might be different attitudes towards his own proposal and, if the Commission was not disposed to accept it as an additional paragraph to the article, the best solution might be to deal with the question in the commentary".¹⁴¹

Mr. Padilla-Nervo referred to his previous arguments regarding the the proposal and emphasized that his remarks:

"...had related merely to the definition of

140. Ibid., pp. 143-144, paras. 9, 21 and 22.

141. Ibid., para. 27.

'natural resources' in article 2 and had been prompted solely by the Chairman's proposal to include a definition of the term in the article, a definition which the Ciudad Trujillo Conference had failed to reach despite the presence of a number of experts and which the Rome Conference had not tried to reach although it was a scientific conference".¹⁴²

The Chairman withdrew his proposal and the Commission decided to leave the draft article 2 as it stood.¹⁴³

The Commission concluded its work in 1956 and provided 73 articles on the Law of the Sea, 67-73 of which dealt with the continental shelf. In its report to the General Assembly regarding draft article 68 the Commission acknowledged that:

"(4) At the eighth session it was proposed that the condition of permanent attachment to the seabed should be mentioned in the article itself. At the same time the opinion was expressed that the condition should be made less strict; it would be sufficient that the marine fauna and flora in question should live in constant physical and biological relationship with the seabed and the continental shelf; examination of the scientific aspects of that question should be left to the experts. The Commission, however, decided to leave the text of the article and of the commentary as it stood".¹⁴⁴

Although the Commission did not succeed in providing a definition which would resolve the problem of the natural resources of the continental shelf, it clearly emphasized both the inclusion and the exclusion of some living resources from the general term. The term 'natural

142. Ibid., paras. 23-29.

143. Ibid., at p. 146, paras. 30-34.

144. YBILC, 1956, Vol. II, pp. 297-298.

resources' included living resources which are permanently attached to the seabed of the continental shelf, but excluded so-called bottom fish and other fish which either occasionally have their habitat at the bottom of the sea or are bred there. These two conditions or guide lines were very important since they indicated a restriction on the policies both of those States which desired the inclusion of all living resources in the regime of the continental shelf and of those which desired their exclusion from that regime.

There were three substantial changes in the Commission's final draft articles regarding the natural resources of the continental shelf compared to its previous one which are likely to give rise to conflict:

1. The sovereign rights of coastal States over the continental shelf were extended beyond the 200 metre depth to where the depth of the superjacent waters admits the exploitation of the natural resources. This change, in practice, would affect the exploitation of the living resources of the continental shelf as defined in article 67 even more than that of minerals.

2. The inclusion of sedentary species which are permanently attached to the seabed within the regime of the shelf and the exclusion of the bottom fish from that regime were not considered by the Commission as a definition of the natural resources; they considered those criteria as conditions or limitations. These limitations could not,

in practice, provide satisfactory measures applicable to most living species which would not fall into the two categories. The lack of precision would lead to great conflict among States who were engaged in the exploitation of those resources which are neither permanently attached to the seabed nor considered as bottom fish. Richard Young, referring to the Commission's commentary on sedentary fisheries, discussed the above problem and stated:

"The difficulties of practical definition which this problem presents can perhaps be shown most effectively by brief reference to a few facts of nature. For example, it might seem simple (though possibly too strict) to limit the sedentary category to so-called sessile species, those having an actual physical attachment to the seabed, like sponges, corals and the edible mussels. Yet, this would be imprecise without further reference to a stage of life for most animals sessile in adulthood go through an earlier free-swimming period; while others, like some jelly-fish, are just the reverse. So restricted a definition would also exclude such species, often called sedentary, as the *beche-de-mer* (a sea cucumber esteemed as a delicacy in the Orient), which creeps and burrows on the bottom, and the commercially imported gold-lip pearl oyster, which at maturity merely lies on the seabed. Then there is the chank, memorably described by a learned judge as an 'incompletely sedentary crustacean' since it 'moves very slowly-eppur si muove'. But even if such relatively slow creatures were to be considered sedentary, there would arise still further questions regarding crustaceans such as lobsters, crabs and the like, which can display considerable speed and agility but which generally require in adulthood a surface to move upon. From lobsters and crabs it is biologically only a step to their relatives, the shrimp, but these, for the most part, are swimming fish excluded by the Commission from the shelf's regime".¹⁴⁵

145. Richard Young, "Sedentary Species and the Convention on the Continental Shelf", 55 AJIL (1961) pp. 359-373, at p. 365.

3. The sovereign rights of the coastal States over the continental shelf and its natural resources as adopted in 1953 had caused some anxiety among certain scientific societies. In 1954 the International Council of Scientific Unions had adopted two resolutions regarding freedom of scientific research on the continental shelf.¹⁴⁶ The United Kingdom Government also drew the Commission's attention to the fact that such research should be protected.¹⁴⁷

Sir Gerald Fitzmaurice, after referring to the importance of scientific research and the general interests in the conservation of the fishing resources and the methods of exploiting sedentary fisheries, stated that:

"The sovereignty of the coastal States must, of course, be accepted as well as the possibility that the coastal State might refuse to permit such research, but the Commission might well include in its comment a clause stating that it was not the intention to encourage States to impede scientific research in the biology and geology of the continental shelf, and expressing the hope that States would not exercise their sovereignty in an unreasonable or vexatious manner. Since it was probable that most coastal States would not wish to do so, that stipulation need not be expressed in an article, but a reference in the comment would reassure the association of scientists..."¹⁴⁸

The ILC's comment relating to scientific research on the seabed and subsoil of the continental Shelf reads as follows:

"... the coastal States will not have the right to prohibit scientific research, in particular

146. Mr. Francois' Report, A/CN.4/17, paras. 53-57.

147. A/CN.4/99/Add. 1, at p. 71.

148. YBILC, 1956, Vol. I, pp. 147-148, paras. 54-55.

research on the conservation of the living resources of the sea. The consent of the State will only be required for research relating to the exploration or exploitation of the seabed or subsoil. It is to be expected that the coastal State will only refuse its consent exceptionally and, in cases in which it fears an impediment to its exclusive rights to explore and exploit the seabed and subsoil".¹⁴⁹

149. YBILC, 1956, Vol. II, at p. 298, comment (10).

C- The First UN Conference on the Law of the Sea

Introduction

In pursuance of Resolution 1105 (XI) adopted by the General Assembly in 1957, the first United Nations Conference on the Law of the Sea was held in Geneva from February 24th to April 27th, 1958.¹⁵⁰ Resolution 1105 stated that the General Assembly:

"Decides, in accordance with the recommendation contained in paragraph 28 of the report of the International Law Commission covering the work of its eight sessions, that an international conference of plenipotentiaries should be convoked to examine the Law of the Sea, taking account not only of the legal but also of the technical, biological, economic and political aspects of the problem, and to embody the results of its work in one or more international conventions or such other instruments as it may deem appropriate".¹⁵¹

The General Assembly referred the report of the Commission's eighth session to the conference as the "...basis for its consideration of the various problems involved in the development and codification of the Law of the Sea".¹⁵²

The Conference, in addition to the General Committee, the Drafting Committee and the Credential Committee established five other committees to which the following subjects were assigned:

Committee I: The Territorial Sea and the Contiguous Zone

Committee II: The General Regime of the High Seas

Committee III: Fishing and the Conservation of the

150. General Assembly, 11th Session, Official Records, Supp. No. 17 (A/3572).

Living Resources of the High Seas.

Committee IV: The Continental Shelf.

Committee V: The Landlocked States.

The Fourth Committee was instructed to deal exclusively with the continental shelf and to consider the International Law Commission's draft articles 67-73.¹⁵³

In this Section the work of the Fourth Committee regarding the continental shelf and its natural resources will be examined.*

151. Ibid.

152. Ibid., para. 9.

153. The Rules of Procedure (A/Conf. 13/35), adopted by the Conference in Plenary on February 24, 1958 (A/Conf. 13/SR.1, at p. 8). It was established in Rule 47 that the Fourth Committee should be a main committee of the Conference to deal with the Continental Shelf and to consider articles 67 - 73 of the ILC's draft articles on the continental shelf. Ibid.

*. The First United Nations Conference on the Law of the Sea was attended by representatives of 86 countries.

i. General Debate

Consideration of the Commission's draft articles 67 - 73 began in the Fourth Committee with a general debate which had been suggested by the General Committee and approved by the Conference.¹⁵⁴ The debate was to be followed by separate discussions on each article. During its proceedings the Committee received nearly 70 proposals and amendments from different delegations and more than one third were related to the first two articles.¹⁵⁵

The Fourth Committee spent 10 meetings on general debate during which representatives of different countries expressed their views on various aspects of the Commission's draft articles. The major criticisms concerned the exploitability criterion and it was argued by representatives of France¹⁵⁶, the United Kingdom¹⁵⁷, the Netherlands¹⁵⁸, the Union of South Africa¹⁵⁹, Greece¹⁶⁰, Lebanon¹⁶¹, Turkey¹⁶², Pakistan¹⁶³ and Italy¹⁶⁴ that the limit of the continental

154. UN. Official Records, Fourth Committee, Summary Records, Vol. VI, pp. 1-2.

155. Ibid., pp. 125-142.

156. Ibid., pp. 1-2, para. 9.

157. Ibid., p. 4, para. 12.

158. Ibid., pp. 6-7, paras. 10-12.

159. Ibid., p. 3, para. 8.

160. Ibid., p. 6, para. 4.

161. Ibid., p. 14, para. 26.

162. Ibid., p. 12, paras. 10-11.

163. Ibid., p. 19, para. 3.

164. Ibid., p. 17, para. 23.

shelf must be definite and certain. Panama¹⁶⁵ and Spain¹⁶⁶ were in favour of a definition which would be based on the scientific criteria taking account of all submarine zones that formed a geological unit with the coast. The representative of the Federal Republic of Germany argued that the seabed and subsoil of the submarine areas beyond the territorial sea should be exploited to the advantage both of the coastal States and of the international community.¹⁶⁷ Both the Russian¹⁶⁸ and the United States¹⁶⁹ representatives were among those who supported the Commission's definition.

Views of representatives regarding the Commission's article 68 can be divided into three categories:

1. Argentina¹⁷⁰ and some other South American States were in favour of the coastal States' sovereignty over the continental shelf and insisted on the inclusion of all living resources within that regime.¹⁷¹

165. Ibid., p. 5, para. 24.

166. Ibid., p. 7, paras. 19-22.

167. Ibid., pp. 7-8, paras. 1-6.

168. Ibid., p. 20, para. 23.

169. Ibid., p. 19, para. 11. The Commission's draft article 67 was also supported by: the Dominican Republic (Ibid., p. 9, para. 3), Colombia (Ibid., p. 10, paras. 8-12), Ghana (Ibid., p. 11, para. 21), India (Ibid., p. 12, para. 5-6), Chile (Ibid., p. 16, para. 12), Venezuela (Ibid., p. 21, paras. 25-27) & Bulgaria (Ibid., p. 23, paras. 5-7).

170. Ibid., pp. 2-3, paras. 1-8.

171. Uruguay (Ibid., p. 5, paras. 22-24), Colombia (Ibid., pp. 9-10, para. 12), Peru (Ibid., pp. 10-11, para. 19),

2. Japan¹⁷², Sweden¹⁷³, Greece¹⁷⁴, Spain¹⁷⁵ and Italy¹⁷⁶ were in favour of the term mineral resources or 'inorganic natural resources' instead of 'natural resources', a term which would exclude all living resources from the shelf regime.

3. The United States¹⁷⁷, the United Kingdom¹⁷⁸, the Netherlands¹⁷⁹, India¹⁸⁰, Pakistan¹⁸¹, the Soviet Union¹⁸², Bulgaria¹⁸³ and Australia¹⁸⁴ all supported the Commission's article though some felt that further consideration was necessary to clarify the living resources involved.

Mexico (Ibid., p. 15, para. 10), Chile (Ibid., p. 16, paras. 14-16, Venezuela (Ibid., p. 21, para. 27); the view supporting full sovereignty over the natural resources of the continental shelf was also expressed by Indonesia (Ibid., p. 26, para. 37) and Iceland (Ibid., p. 28, paras. 13-19).

172. Ibid., p. 14.

173. Ibid., p. 3, para. 10.

174. Ibid., pp. 5-6, para. 5.

175. Ibid., p. 7, para. 21.

176. Ibid., pp. 16-17, para. 23.

177. Ibid., p. 20, para. 15.

178. Ibid., p. 4, para. 12.

179. Ibid., p. 7, para. 13.

180. Ibid., pp. 12-13, para. 7.

181. Ibid., p. 19, para. 5.

182. Ibid., pp. 20-21, paras. 22-24.

183. Ibid., p. 23, para. 7.

184. Ibid., p. 29, para. 23.

ii. The Committee's Debates on Article 67

The Committee's debates on separate articles began at its 13th meeting and the discussions on article 67 regarding the definition of the continental shelf took 7 meetings during which 12 proposals and amendments were submitted by various delegations.¹⁸⁵ The proposals submitted to the Committee can be divided into four groups as follows:

1. Depth Limit

Both France and Lebanon submitted amendments to eliminate the exploitability clause and preferred the 200 metre depth as a sole criterion.¹⁸⁶ The limit of 200 metres was not acceptable to many States for different reasons. These were mainly:

a. The possibility of the exploitation of the continental shelf beyond the 200 metre depth in the near future.

b. The extension of the continental shelf beyond that limit in some areas.

c. The problem concerning States without a regular submarine shelf.

The French proposal which was identical to the one submitted by the Lebanon was put to the vote and was rejected by 48 votes to 12 with 7 abstentions.¹⁸⁷

185. Ibid., pp. 125-143.

186. For French proposal see A/Conf. 13/C.4/L.7 and for the Lebanese proposal see A/Conf. 13/C.4/L.8.

187. UN. Official Records, Op. Cit., in note 154 (p. 177), pp. 46-47, para. 10.

Further proposals concerning the depth limit were submitted by the United Kingdom which referred to a 550 metres depth.¹⁸⁸ The figure of 550 metres was further referred to in a joint proposal by the United Kingdom and India.¹⁸⁹ The revised Indian proposal which was supported by the representatives of the Netherlands and the United Kingdom read as follows:

"For the purposes of these articles, the term 'continental shelf' is used as referring to the seabed and subsoil of the submarine areas adjacent to the coast but outside the area of the territorial sea, to a depth of 550 metres of the superjacent waters".¹⁹⁰

The above proposal was rejected by 31 votes to 21 with 16 abstentions.¹⁹¹

2. Depth and Distance Limit

The proposal by Yugoslavia referred to a combined criterion of depth and distance and read as follows:

"1. For the purposes of these articles the term 'continental shelf' is used as referring to the seabed and subsoil of the submarine areas adjacent to the coast but outside the area of the territorial sea, to a depth of 200 metres, but only up to a boundary line not extending beyond 100 miles from the outer limit of the territorial sea. Local occurrences of submarine gorges, valley, depressions and ravines shall not be taken into account in this area of 100 miles, provided they are within the outer limit of the continental shelf as described in the preceding sentence.

2. Where such a depth is greater, the continental shelf stretches only up to a boundary line

188. A/CONF. 13/C.4/L.19 and A/CONF. 13/C.4/L.19 (Rev. 1).

189. A/CONF. 13/C.4/L.24 (Rev. 1).

190. A/CONF. 13/C.4/L.29 (Rev. 1).

191. UN. Official Records, Op. Cit., in note 154 (P. 177), pp. 46-47, para. 12.

not extending beyond 50 miles in the direction of the high seas from the outer limit of the territorial sea".¹⁹²

The Yugoslav proposal was rejected by 39 votes to 2, with 21 abstentions.¹⁹³ It must be noted that the Yugoslav proposal would have benefited States which had broad and regular shelves and therefore, would have been to the disadvantage of States with irregular or narrow shelves. The second paragraph of the proposal was meant to compensate those latter unfortunate States; this idea had been discussed by the ILC at its 5th session.¹⁹⁴

3. Depth and Shelf Edge

The Canadian proposal referred to the continental shelf in its geological concept and referred to the limit of 200 metres or where the submarine areas extended beyond that limit.¹⁹⁵ This proposal was reintroduced by the Federal Republic of Germany and was rejected by 45 votes to 4, with 18 abstentions.¹⁹⁶ The revised Canadian proposal¹⁹⁷ which extended the limit to 550 metres instead of 200 metres was also rejected by 39 votes to 16 with 12 abstentions.¹⁹⁸

192. A/CONF.13/C.4/L.12.

193. Official Records, Op. Cit., in note 154 (p. 177), pp. 46-47, para. 10.

194. Official Records of the General Assembly, 5th Session, Supp. 12 (A/1316), para. 198.

195. A/CONF. 13/C.4/L.30.

196. Official Records, OP. Cit., in note 154 (p. 177), p. 47, para. 14.

197. A/CONF.13/C.4/SR 19, pp. 2-3.

198. Official Records, Op. Cit., in note 154 (p.177), p.47, para. 14.

4. Geological Limit

The definition of the continental shelf based only on the geological meaning of the term was proposed by the representative of Panama. It referred to the "continental shelf proper and the continental slope with its gorges, valleys, depressions and ravines as far as the further points at which the depth of the superjacent waters admits of the exploitation" and excluded "the great depths of oceanic basins".¹⁹⁹ This proposal was rejected by 38 votes to 4 with 26 abstentions.²⁰⁰

The Korean proposal,²⁰¹ which referred to the exploitability criterion only was rejected by 42 votes to 13, with 13 abstentions.²⁰²

The only proposal approved by the Fourth Committee was the one which had been submitted by the delegation of the Philippines as an additional paragraph to article 67. It read as follows:

"All references in these articles to 'continental shelf' shall be understood to apply also to similar submarine areas adjacent to and surrounding the coasts of islands".²⁰³

A joint proposal by the Netherlands and the United Kingdom also included the submarine areas of the islands within the shelf regime.²⁰⁴ The additional paragraph

199. A/CONF.13/C.4/L.4.

200. Official Records, Op. Cit., in note 154 (p. 177), p. 47, para. 14.

201. A/CONF.13/C.4/L.11.

202. Official Records, Op. Cit., in note 154 (p. 177), p. 47, para. 14.

203. A/CONF.13/C.4/L.26.

proposed by the Philippines was adopted by 31 votes to 10, with 25 abstentions.²⁰⁵ The Commission's draft article 67, as amended, was approved by an overwhelming majority in the Fourth Committee.²⁰⁶

The article, as amended, read as follows:

"For the purposes of these articles, the term 'continental shelf' is used as referring (a) to the seabed and subsoil of the submarine areas adjacent to the coast, but outside the area of the territorial sea, to a depth of 200 metres or, beyond that limit, to where the depth of the superjacent waters admits of the exploitation of the natural resources of the said areas; (b) to the seabed and subsoil of similar submarine areas adjacent to the coasts of islands".

The above article was adopted by the Conference in Plenary Session in convention form as article one.²⁰⁷

204. A/CONF.13/C.4/L.32. This joint proposal also defined the continental shelf and referred to the depth of 550 metres.

205. Official Records, Op. Cit., in note 154 (p. 177), p. 47, para. 14.

206. Ibid.

207. Final Text of Convention on the Continental Shelf adopted by the Conference, Final Act, A/CONF.13/L.58 and A/CONF.13/L.55.

iii. The Committee's Debates on Article 68

The Commission's draft article 68, which referred to coastal States' sovereign rights over the natural resources of the continental shelf gave rise to a series of discussions in the Fourth Committee. The two important issues to which most proposals and amendments were related were the nature of the right vested in coastal States and the definition of natural resources.

Proposals and amendments submitted to the Committee regarding draft article 68 were divided into three groups. First, there were proposals and amendments which either referred to sovereignty²⁰⁸, or included all living resources within the definition of 'natural resources'.²⁰⁹ Representatives of Burma, Mexico, Peru, Argentina and Yugoslavia were among the first group. At the Committee's 24th meeting the proposal by Burma, representing the interests of the first group, was rejected by 42 votes to 11 with 11 abstentions.²¹⁰

Secondly, there were the proposals and amendments which referred to coastal States' 'sovereign rights' over the mineral resources of the continental shelf. Representatives of Japan, Greece, Federal Republic of Germany and Sweden were among those who supported this view.²¹¹ The proposal by Greece representing this group was rejected

208. Argentina (A/CONF.13/C.4/L.6); Mexico (A/CONF.13/C.4/L.2).

209. Burma (A/CONF.13/C.4/L.3); Yugoslavia (A/CONF.13/C.4/L.13).

210. Official Records, Op. Cit., in note 154 (p. 177), p. 69, para. 28.

211. Sweden (A/CONF.13/C.4/L.9); Greece (A/CONF.13/C.4/L.39),

by 52 votes to 7 with 6 abstentions.²¹²

Thirdly, there were proposals and amendments which in principle supported the Commission's draft article 68 and its commentaries on the article, but suggested further clarification of the term 'natural resources'. This view which was supported by a large number of delegations appeared in a joint proposal submitted by Australia, Ceylon, Federation of Malaya, India, Norway and the United Kingdom.²¹³ The amendment read as follows:

"The natural resources referred to in these articles consist of mineral and other non living resources of the seabed and the subsoil together with living organisms belonging to sedentary species; that is to say, organisms which, at the harvestable stage, are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or the subsoil; but crustacean and swimming species are not included".

Professor Bailey of Australia explained the meaning of the amendment to article 68 submitted by the six powers in the following terms:

"... the amendment to article 68 submitted jointly by his own and other delegations was merely a detailed expression of the principle laid down in the International Law Commission's commentary on the article. The reason why a definition of 'natural resources' was necessary was clear from the Commission's commentary. The Commission had agreed that the drafting of a definition required a combination of legal and scientific experience which it lacked. The joint amendment was the result of close consultation

Federal Republic of Germany (A/CONF.13/C.4/L.43).
See Official Records, Op. Cit., in note 154 (p. 177),
p. 14, para. 2.

212. Ibid., p. 69, para. 69

213. A/CONF.13/C.4/L.36.

between lawyers and biologists. The resources covered by the definition proposed in the joint amendment were 'mineral and other non-living resources' and also 'living organisms belonging to sedentary species'. Most of the non-living resources of the seabed and subsoil were, of course, mineral resources, but the words 'and other non-living resources' had been added so that the article would apply to resources such as the shells of dead organisms. So far as the living resources in question were concerned, the sponsors of the amendment had acted on the basis of considerations of legal principles and practical utility. They considered that it was the permanent, intimate association of certain living organisms with the seabed which justified giving the coastal State exclusive rights in regard to such organisms. The words 'living organisms belonging to sedentary species' were broadly equivalent to 'the product of sedentary fisheries' which was the term used by the Commission in paragraph 3 of its commentary. The permanent association of some living resources with mineral resources of the seabed and subsoil was such that it was best that both these types of resources should be exploited jointly. They were harvestable in such a way that it was appropriate to give the coastal State sovereign rights in respect of both types. Some sedentary living organisms were such permanent features of the seabed that it was inadvisable that they should be thrown open to unregulated universal exploitation.

The living organisms of the seabed and subsoil belonging to sedentary species comprised organisms such as coral, sponges, oysters, including pearl-oysters, pearl shell, the sacred chank of India and Ceylon, the trachus and plants. It would be senseless to give the coastal States sovereign rights over mineral resources such as the sands of the seabed, but not over the coral, sponges and the living organisms which never moved more than a few inches or a few feet on the floor of the sea.

The sponsors of the amendment had agreed that no crustacean or swimming species should be covered by the definition. Swimming species were obviously not sedentary. It was true that the term 'crustacean' included all crabs, of which some species were unable to move except in contact with the seabed or subsoil; but those species could move considerable distances".²¹⁴

214. Official Records, Op. Cit., in note 154 (p. 177),

A Mexican oral sub-amendment to the six power amendment (to delete the words 'crustaceans and....' from the last phrase) was rejected by 27 votes in favour and 27 against with 13 abstentions²¹⁵, and the six power's amendment was adopted by 41 votes to 11 with 17 abstentions.²¹⁶

The proposal of the United States which suggested the replacement of the word 'sovereign' by 'exclusive', was adopted by 21 votes to 20 with 27 abstentions.²¹⁷ This amendment formed the first paragraph of article 68 which read as follow:

"The Coastal State exercises over the continental shelf exclusive rights for the purpose of exploring it and exploiting its natural resources".

The second paragraph of article 68 which had, originally, been introduced in the Yugoslav and Argentine proposals²¹⁸ was adopted by 37 votes to 5 with 24 abstentions.²¹⁹ It read as follows:

"2. The rights referred to in paragraph 1 of the present article are exclusive in the sense that if the coastal State does not explore the continental shelf or exploit its natural resources, no one may undertake these activities, or lay claim to the continental shelf, without the express consent of the coastal State".

The third paragraph of article 68 which had originally been introduced in paragraph 7 of the Commission's commentary

pp. 56-57, paras. 18-24.

215. Ibid., p. 70, para. 29.

216. Ibid.

217. Ibid., p. 69, para. 24. For the US proposal see A/CONF.13/C.4/L.31.

218. A/CONF.13/C.4/L.13, A/CONF.13/C.4/L.6/Rev.2.

219. Official Records, Op. Cit., in note 154 (p.177), p.75.

on draft article 68 in 1956 was re-introduced in a proposal by the Cuban delegation.²²⁰ This proposal was adopted by the Committee by a vote of 41 in favour, 7 against, with 12 abstentions.²²¹ It read as follows:

"The rights of the coastal State over the continental shelf do not depend on occupation, effective or notional, or any express proclamation".

The vote on article 68 in the Fourth Committee was 34 in favour, 14 against with 17 abstentions.²²²

At the 8th Plenary Session of the Conference the United States delegation receded from its former position regarding the first paragraph of article 68 and supported the ILC wording of 'sovereign rights' in place of 'exclusive rights'.²²³ It was adopted by 51 votes to 14 with 6 abstentions.²²⁴

Another important change was the elimination of the final phrase "but crustacean and swimming species are not included" from the definition of the natural resources. The vote on article 68, which now appears as article 2 of the Convention on the Continental Shelf, was 59 in favour, 5 against, and 6 abstentions.²²⁵

220. A/CONF.13/C.4/L.45 and Corr. 1.

221. Official Records, Op. Cit., in note 154 (p. 177), p. 75, para. 12.

222. Ibid., p. 70, para. 45.

223. A/CONF.13/SR.8, pp. 8-9.

224. Ibid., p. 11.

225. Ibid., p. 12.

Conclusion

The wording of Article 1 of the Convention on the Continental Shelf "for the purposes of these articles" clearly suggests that the definition of the continental shelf in the Convention is an arbitrary legal definition and it should, therefore, be construed and acted upon accordingly. It is obvious that the whole geological concept of the continental shelf, i.e. the continuation of the land mass under the seawater, is completely absent from this definition and the 200 metres depth, which is the average depth of the outer boundary of the continental shelf referred to in Article 1 (a) has no real significance in this definition since it is coupled with the exploitability clause. The result of this clause is that if a coastal State has the technological means to exploit the natural resources of the continental shelf beyond the 200 metres depth there is no limit to the extent of the exercise of its sovereign rights.

It would perhaps be logical to assume that the exploitability clause was meant to operate only when the continental shelf does not cease to exist at 200 metres depth and continues beyond that limit to a greater depth. This assumption cannot be supported on the ground that the right of coastal States to exploit the natural resources of the continental shelf beyond 200 metres is not an absolute one, but is conditioned by coastal States' technological capabilities. In other words, States whose

continental shelves extend beyond the 200 metres depth cannot claim any rights unless they are technologically advanced and can, in practice, exploit their natural resources.²²⁵ It should also be pointed out that it is not clear whether the coastal State's ability to exploit the natural resources of the continental shelf beyond the 200 metres depth is based on its own technological capabilities or whether it can receive technological aid from another State or States.

On the other hand, article 1 (a), while dismissing the geological definition of the continental shelf, introduced the 'adjacency' criterion which has given rise to some controversial views on how the term should be construed. It is admitted that 'adjacent' means 'lying near' or 'contiguous' and the latter has been defined as 'touching, adjoining and neighbouring'.²²⁶ The definition of the term 'adjacent', however, does not bear any importance in itself and the reading of article 1 (a) while it refers to the rights of coastal States beyond 200 metres depth to where the depth of the superjacent waters admits of exploitation leaves little, if any, significance to be accounted to the literal meaning of the word.

The problem of the outer boundary of the continental

225. See Leo J. Bouchez, "The Outer Boundary of National Jurisdiction", *Pacem in Maribus* (1971), Vol. II, pp. 50-67, at pp. 56-57. See also E.D. Brown, *Op. Cit.*, in note 21 (p. 14), at pp. 5-8.

226. See above pp. 12-16.

shelf remained unsolved since the Convention on the Continental Shelf did not place any clear legal restriction on the coastal State's sovereign rights over the submarine areas.

The first paragraph of article 2 (4) which refers to the mineral and non-living resources of the seabed and subsoil of the continental shelf has not created any difficulty and all coastal States share the view that those resources are within the sovereign rights of the coastal States.

The second paragraph, which refers to the living organisms of the continental shelf, is vague and ambiguous and States have, so far, taken different views regarding its interpretation. The phrase "living organisms belonging to sedentary species" used in article 2 (4) has neither a legal nor a scientific basis. From the legal point of view the concept of sedentary fisheries in the light of state practice before the Convention was limited basically to pearl, chank, coral and sponge fisheries and there were only a few legislative acts relating to the exploitation of such fisheries beyond the three mile limit. It was not a right exercised by all coastal States and international law only recognised those which had been based on immemorial and long-standing practice. On the other hand, in biological terms, there does not exist any group or sub-group of living organisms known as or classified as 'sedentary'.²²⁷ The literal meaning of the term 'sedentary' which is defined as 'not migratory' or 'not free swimming', would include

227. See below Chapter V (B), (C) and (D).

most benthic plants and animals whose movements are very diverge and complicated. Many organisms belonging to so-called 'sedentary species' are in fact free-swimming and others move about by means of crawling but do not swim. Young, in discussing the legal aspects of sedentary species, refers to the ambiguity of Article 2(4) in the following words:

"Of the creatures important to man only the crustaceas still seem to be in an uncertain position. These had been expressly excluded from the sponsors' original draft of the text and Dr. Garcia Amador has affirmed with the authority of first hand knowledge that this is still the case. Yet, it is submitted, with all respect, that this is not self-evident. Certain crustaceans, such as the spiny lobsters, would appear to meet the requirement of being at the harvestable stage in constant physical contact with the seabed, and so come within the shelf regime. Doubt on this point may persist until resolved by practice".²²³

It was later pointed out by Dupuy that "it appears that the vagueness of the article is, in practice, the subject of unilateral and conventional interpretations".²²⁹

The vagueness of article 2(4) and its unilateral and conventional interpretations gave rise to a few disputes which will be discussed in Chapter VIII.

In the following Chapter we shall look at species from different classes of molluscs and species belonging to the class crustacea. In defining the various species it is intended to establish: first, to what extent these species are associated with the seabed and subsoil of the

228. Loc. Cit., in note 145 (p. 172), at p. 368.

229. Rene Dupuy, "Legal Foundations of Ocean Regime", Vol. II, *Pacem in Maribus*, 1971, at p. 167.

continental shelf; secondly, to what extent their mobility can be regarded as a satisfactory criterion for determining their legal status and thirdly, to what extent these species can be exploited under different regimes without endangering the biological productivity of the coastal zone and the ecosystem.

PART TWO

NATURAL RESOURCES OF THE CONTINENTAL SHELF

Introduction

The term 'natural resources' has been used in unilateral declarations regarding the continental shelf as well as in the 1958 Geneva Convention on the Continental Shelf. The term has never been defined and the resources have never been identified in those instruments.

In this Part the meaning of the term 'natural resources' will be examined.

Natural resources of the continental shelf have been divided into two groups; the living resources and the non-living resources. Not all of the resources referred to in the next two chapters are being exploited. Some of these resources are potential resources whose exploitations are expected to begin in the near future. In addition to the descriptions of the natural resources their legal status, according to the provisions of the 1958 Geneva Convention on the Continental Shelf and the provisions of the Texts, which have been the basis of the negotiations by the UNCLOS III, will be examined.

CHAPTER V

LIVING RESOURCES OF THE CONTINENTAL SHELF

Introduction

In its Resolution 1105 (XI) adopted in 1957, the General Assembly referred to the recommendation contained in paragraph 28 of the report of the International Law Commission covering the work of its Eighth Session and stated that:

"...an international conference of plenipotentiaries should be convoked to examine the law of the sea, taking account not only of the legal, but also of the technical, biological, economic and political aspects of the problem, and embody the results of its work in one or more international conventions or such other instruments as it may deem appropriate".¹

Prior to the 1958 Geneva Conference on the Law of the Sea the Secretariat of the Food and Agriculture Organisation of the United Nations (FAO) prepared a document for the Conference in which some biological aspects of the living resources of the continental shelf were examined.² It was pointed out in the document that:

"In only very few species of aquatic organisms is the entire life of each individual spent in close association with the shelf, seabed and the water lying above it; in most organisms there is a free-swimming phase in the middle or surface water. However, since in most cases the conditions of life for such a pelagic phase are only to be found in shelf waters, there continues to be for

-
1. General Assembly, 11th Session, Official Records, Supp. No. 17 (A/3572).
 2. A/CONF. 13/13.

them a necessary and dependent relation between the organism and the shelf even in the free-swimming phase".³

The definition of natural resources in Article 2(4) of the 1958 Geneva Convention on the Continental Shelf can hardly be considered either to have complied with the requirement of the General Assembly, or to have recognised the facts acknowledged by the FAO's experts. The only dominant element in its definition of the natural resources of the continental shelf was the consideration of protecting the freedom of the high seas. The omission of basic economic and biological factors from the definition of the natural resources, together with the vagueness of Article 2(4), have been the main obstacles to the establishment of a uniform practice among States regarding the definition, claims and exploitation of the natural resources.⁴

In this Chapter the question of the living resources of the continental shelf, with reference to biological and economic factors, will be discussed. These factors are closely related to the dominant problems of the exploitation of the natural resources, such as maintenance of productivity, allocation of the natural resources and their conservation. It will be seen that the extensive claims over natural resources made by some States since the Convention on the Continental Shelf came into force are, to a large extent, due to these biological and economic factors.

3. Ibid.

4. See below Chapter VIII " The Disputes" and Chapter IX.

A- Primary Production in the Coastal Zone

i. Definition of Natural Resources

The word 'resource' means 'supply' and natural resources are, therefore, those supplies available from the natural environment.⁵ The Fontana Dictionary of Modern Thought defines the term 'natural resources' in the following terms:

"That part of the material components of the environment, including both mass and energy, physical and biological, that can be used by man. As such, resources are bounded by concepts of utility, and resource estimates change with changing technological and socio-economic conditions"⁶

Natural resources can be divided into two groups; living resources and non-living resources. Johnston has defined the term living resources of the sea as "... all the animal and vegetable products of the oceans".⁷

There are three major groups of living organisms in the sea: 1. Plankton, 2. Nekton, 3. Benthos. These will be discussed in detail below.

1. Plankton - This group includes both microscopic plants (phytoplankton) and animals (zooplankton). There are two groups of zooplankton: first, those species, in their entire life cycle remain planktonic and are termed holoplankton; and second, those species which have planktonic life in the early stages of their life cycle, such

5. Skinner and Turekian, Op. Cit., in note 2 (p. 3), p. 24.

6. The Fontana Dictionary of Modern Thought, edited by Alan Bullock and Oliver Stallybrass, 1977, at p. 540.

7. Douglas M. Johnston, The International Law of Fisheries, 1965, at p. 4.

as larvae of fish and benthic invertebrates, and are termed meroplankton. Holoplankton dominate the zooplankton community; the concentration of meroplankton depends on geographical location and proximity to land.⁸

2. Nekton - This group comprises all swimming species and is the largest and commercially the most important group of living resources of the sea. Nekton is divided into two groups; demersal and pelagic. (a) demersal species or bottom fish are those species which because of their feeding habits live near the bottom of the sea and include most commercially exploited species such as cod, haddock, plaice, sole, halibut, flounder, skate and dogfish. It is important to mention here that demersal species are usually found in those parts of the continental shelf where the seabed contains a high quantity of food and their populations reduce with the increase of depth.⁹ (b) pelagic species are those which are generally known as surface-feeding and include herring, sardine, anchovy, menhaden, mackerel, tuna, salmon and pilchard.¹⁰ The geographical distribution of both demersal and pelagic species has been described by Meadows and Campbell as follows:

"Geographically most fisheries for bottom fish and also for many pelagic fish are over the continental shelves around Europe and North America and off Japan. This is partly because these areas are near land, partly because bottom-dwelling or demersal fish, such as cod, haddock and plaice, live on the abundant continental shelf bottom fauna

8. L.P. Reymond, P.K. Bienfang and J.A. Hanson, "Nutritional Considerations of Open Sea Mariculture", in Open Sea Mariculture, Op. Cit, in note 12 (p. 8) pp. 127-132, at p. 139.

9. Johnston, Op. Cit, in note 7 (p. 198), pp. 5-8.

10. Ibid.

(worms, molluscs, ophiuroids). Demersal fish could not live in the abyssal depths of the ocean because of the lack of food, and even if they did they could not be caught by present day fishing methods. Pelagic fishes, such as herring, anchoveta and sardines are also more abundant over the continental shelves, probably because the productivity of their planktonic food is higher there than in the centre of the deep oceans".¹¹

3. Benthos - This group comprises both plants, such as blue, green and red algae, and animals including species of molluscs and crustaceans. It includes important species such as clams, oysters, mussels, scallops, cuttlefish, lobsters, crabs, squid, winkles, cockles, shrimps, krill, sea-urchins, sea-cucumbers, sponges, corals and pearl oysters.¹²

There is, however, an uninterrupted interrelationship among various species of plankton, nekton and benthos. This interrelationship reflecting the transfer of energy from one trophic level to another is known as the food chain or food web.

ii. Ecology of the Coastal Zone

On the basis of the ecological factors concerning the biological productivity of living resources the sea has been divided into two major zones; the Neritic Zone and the Oceanic Zone.¹³ The water covering the continental

11. P.S. Meadows and J.I. Campbell, Marine Science, 1978, at pp. 113-115.

12. See below C "Molluscs" and D "Crustacea".

13. W.B. Clapham, Natural Ecosystem, 1973, at p. 172, see also above pp. 9-10.

shelf up to a depth of 200 metres is termed the neritic zone and the rest is called the oceanic zone. The neritic zone has been distinguished from the oceanic zone by marine biologists because of its unique characteristics which are based primarily on the presence of the shelf and its nearness to the land. Both features contribute to the high concentration of nutrients:

"Nutrient concentrations tend in general to be higher in the neritic zone than off-shore. This is caused partly by runoff from land; but probably more important is the presence of the shallow bottom, which eliminates the downward loss of nutrients that is characteristic of the deep sea".¹⁴

The ecology of the coastal zone is the study of the individual, the population, the group of populations and the environment of the living resources which habitually live in the neritic zone.¹⁵

Biologists start from the point that matter comes from energy and, therefore, not only its existence, but its maintenance depends on it. Thus biological productivity is subject to the availability and the transfer of energy in the ecosystem.¹⁶ There is in any ecosystem a need for

14. E.D. Stroup and S.V. Smith, "Physical Oceanography and Geology", in *Open Sea Mariculture*, Op. Cit, in note 12 (p. 8), pp. 61-105, at p. 95.

15. D.H. Cushing, "The Nature of Ecology", in The Ecology of the Seas, edited by D.H. Cushing and J.J. Walsh, 1976, pp. 1-5.

16. Cushing notes that "Dice in 1952 defined an ecosystem as a community within its environment and from this concept developed the idea of energy flowing through the system". Ibid., at p. 7.

a continuous flow of energy in order to keep that ecosystem alive. The importance of the continual need for energy flow in biological systems has been emphasized by Russell-Hunter who states:

"If the energy flow through a biological system does not continue (to some extent), then the system is no longer a living one, and its components will pass almost immediately (if not prevented by human artifact) to dissolution, both by autolysis (self-digestion) and decay. Living systems are maintained by the continuous flow of energy through them".¹⁷

The need for energy of living organisms and their process of acquiring it have been described by Clapham:

"Living organisms can use energy in several forms, but all can be grouped under one of two headings: radiant and fixed. Radiant energy is in the form of electromagnetic waves, such as light. Fixed energy is potential chemical energy bound up in various organic substances which can be broken down or reacted with something else in order to release their energy content. Organic substances are molecules containing the element carbon, and they are produced by living organisms".¹⁸

All living organisms with regard to their energy relations in most ecosystems are divided into three categories: plants, animals and decomposers. The interdependence of the above organisms has been described by Russell-Hunter in the following terms:

"The autotrophic component of the ecosystem - the green plants - can be referred to as the producers. This is emphasised in many descriptions of ecosystems by referring to the

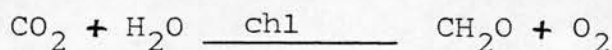
-
17. W.D. Russell-Hunter, Aquatic Productivity, 1970, at p. 16; see also John H. Steele, The Structure of Marine Ecosystems, 1974, pp. 1-2, R.V. Tait, Elements of Marine Ecology, 1972, p. 284.
18. Clapham JR, Op. Cit., in note 13 (p. 200), at p. 22.

chlorophyll-bearing energy-fixing organisms as the primary producers of the community. Of the heterotrophic parts of the community, the animal component can be termed consumers. The simplest trophic subdivision of the consumers category into herbivores and carnivores is obvious. The other heterotrophic organisms act as decomposers, sometimes as transformers, and are chiefly bacteria and fungi. Such organisms (often spoken of as saprophytic) break down the complex organic materials of dead plants, dead animals, and animal excreta and, while absorbing some of the products of decomposition for their own growth and other energy requirements, characteristically release simpler chemical substances such as soluble inorganic salts, which are then suitable for uptake by green plants".¹⁹

Within an ecosystem the biological productivity is, therefore, determined by the production and distribution of the primary producers. Algae or phytoplankton of the sea containing chlorophyll are capable of converting radiant energy into fixed energy through photosynthesis.²⁰ In addition to radiant energy the process of photosynthesis is subject to the availability of a few inorganic substances among which the most important is carbon, the element on which the entire living world is based.²¹ The seawater with its floating plants and animals contains eighty to one hundred times more carbon in forms available to plants

19. Russell-Hunter, Op. Cit., in note 17 (p. 202), at p. 10.

20. The photosynthesis process is described as:



See C.J. Lorenzen, "Primary Production in the Sea", in the Ecology of the Seas", Op. Cit., in note 15 (p. 201), pp. 173-186, at pp. 173-174; see also Perkins, Op. Cit., in note 13 (p. 9), at pp. 7-8.

21. Alan J. Brook, The Living Plant, 1964, pp. 205-212.

than does the atmosphere where the quantity of carbon dioxide present is only 0.03%.²²

Green plants are considered anabolic organisms of constructive metabolism which means that they elaborate organic material from inorganic sources via photosynthesis. No animal is capable of doing this and, therefore, all animals depend either directly (herbivores) or indirectly (carnivores) on plants.²³

iii. Primary Production in the Coastal Zone

The primary producers of the coastal or neritic zone consist of phytoplankton and benthic (fixed) plants; the latter are characteristic of the coastal zone.²⁴ Both production and distribution of primary producers are controlled by the following factors:

- a - physical factors (light and temperature)
- b - chemical factors (nutrients)
- c - biological factors (intrinsic growth rate and grazing)²⁵

The effect of physical and chemical factors on the production of primary producers is summarized by Perkins and is shown in table 1 (p. 205).

22. Ibid.

23. A.C. Campbell, The Seashore and the Shallow Seas of Britain and Europe, 1976, at p. 18.

24. Kenneth H. Mann, "Production on the Bottom", in The Ecology of the Seas, Op. Cit., in note 15 (p. 201), pp. 225-251, at pp. 226-228.

25. L.P. Reymond, P.K. Bienfang and J.A. Hanson, "Nutritional Considerations of Open Sea Mariculture", in Open Sea Mariculture, Op. Cit., in note 12 (p. 3), pp. 129-182, at p. 131.

Table 1 ²⁶

Season	Nutrients	Temperature	Light	Phytoplankton
winter	abundant	cold	weak	scarce
spring	abundant	moderate	moderate	major bloom
summer	scarce	warm	strong	scarce
autumn	moderate	moderate	moderate	minor bloom

The distribution of primary production in all areas of the sea has been estimated by Ryther. The coastal zones or the continental shelves which form only 3% of the earth's surface contribute more than one fourth of the ocean's total primary production as shown in table 2.²⁷

Table 2

Area	% of ocean surface	Total Primary Production (tons C. yr ⁻¹)
open ocean	90	16.3×10^9
coastal zone	9.9	3.6×10^9
upwelling areas	0.1	0.1×10^9

The most important factor contributing to the high productivity of the primary producers in the coastal zones is the chemical factor, that is to say, the availability of the essential nutrients necessary for the growth of primary producers. Lorenzen refers to the fact that in

26. Perkins, Op. Cit., in note 13 (p. 9), at p. 80.

27. J.H. Ryther, "Photosynthesis and Fish Production in the Sea", Science 166 (1969), at pp. 72-76. See also Lorenzen, Loc. Cit., in note 20 (p. 203), at p. 179, see also Tait, "Geographical Differences of Fertility", in Elements of Marine Ecology, Op. Cit., in note 17 (p. 202), at p. 146.

open ocean although photosynthesis takes place subsequent conditions such as the lack of nutrient supplies limit the rate of population. He states that:

"One can view the open 'blue' ocean as a system containing rather low-standing crops of nutrients, plants, and animals turning over at some moderate rate. It is almost a closed system. At the other end of the spectrum we find a rather different set of circumstances in the coastal region of the world's oceans. At intermediate latitudes at least, we find a markedly high level of nutrients, plants and animals... The major difference between these regions and the open ocean is the mechanisms which supply nutrients necessary for plant growth to the euphotic".²⁸

The mechanisms which provide the nutrients necessary for the growth of the phytoplankton have been described by Banse as follows:

"The phytoplankton production on the continental shelves is different from that of deep water in that the seabed prevents the nutrient salts tied up in particulate matter from sinking to great depths. In fact, in spite of the losses due to respiration, demersal fishes preying on bottom animals occur in large enough quantities to be exploited by man. In depths shallow enough to be in the upper, warm layers, the nutrient salts continually liberated by the respiration of bottom organisms are immediately available to the phytoplankton and can be re-used several times during one season, raising the annual production figure considerably above that of open ocean with the same concentration of nutrient salts. The bottom environment favours bacteria much more than does the open water, and much nutrient salt liberation is believed to be due to them".²⁹

28. Lorenzen, Loc. Cit., in note 20 (p. 203), at p. 178.

29. Karl Banse, "Global Distribution of Organic Production in the Ocean", in Ocean Resources and Public Policy, edited by T. Saunders English, 1973, pp. 38-48, at pp. 44-45.

The importance of bacteria mentioned by Banse has also been emphasized by Perkins who says:

"Bacteria, in general, are more abundant in association with sediments than the water above, and are more abundant in neritic than they are in oceanic zone".³⁰

It is important to note here that many species belonging to the benthos community, such as molluscs, are deposit feeders whose diet includes bacteria.³¹

Biological productivity is, therefore, based on primary production and primary production is mainly determined by the availability of nutrients necessary for the growth of phytoplankton. As a result of the high productivity of the primary producers in the continental shelves the production of nekton and benthos is remarkably higher in those areas than in the waters beyond the continental shelves.

iv. Primary Producers and Nutrient Salts

There are, as mentioned earlier, two groups of plants in the coastal waters: phytoplankton and benthic plants.

1. Phytoplankton

Generally speaking, there are three major groups of phytoplankton: diatoms, dinoflagellates and naked green

30. Perkins, Op. Cit., in note 13 (p. 9), at p. 71. Another important function performed by bacteria has been described by Perkins:
"Bacteria are responsible for the production of petroleum, oxidized hydrocarbon, oxidize ammonia in sea water to nitrite and the sulphate reducing bacteria present in sediments are capable of nitrogen fixation". Ibid., at p. 186. See also A.D. Boney, Phytoplankton, 1975, pp. 6-16, Tait, Op. Cit., in note 17 (p. 202), at p. 19.

31. Perkins, Op. Cit., in note 13 (p. 9), at p. 186.

flagellates.³²

In addition to carbon dioxide, phytoplankton need nitrogen, phosphorous and, in the case of diatoms, silicon for their growth. These nutrients are present in seawater in inorganic form as phosphate, nitrate and silicate.³³ The major source of phosphorous and silicon is land drainage. Land runoff also introduces nitrogen compounds into the sea although, as has been pointed out by Dugdale, "... the larger proportion (of nitrogen) comes from the atmosphere and is a result of evaporation of ammonia from the land surface".³⁴ The highest productivity of the phytoplankton occurs in areas approximate to land where the nutrients necessary for their growth originate from the land, or in upwelling areas.³⁵ It is important to point out that even upwelling is usually characteristic of the coastal zone. According to Tait:

"Although this upwelling water probably does not rise from depths greater than some 100-200m, this is deep enough to supply nutrients to the Canaries Current, Benquela Current, Peru Current, California Current and West Australia Currents, and these are all areas of high fertility".³⁶

-
32. Raymond et al, Loc. Cit., in note 25 (p. 204), at pp. 133-139; see also Tait, Op. Cit., in note 17 (p. 202), at pp. 78-83; Lorenzen, Loc. Cit., in note 20 (p. 203), at pp. 177-181.
33. Raymond et al, Loc. Cit., in note 25 (p. 204), at p. 133.
34. R.C. Dugdale, "Nutrient Cycle", in The Ecology of the Seas, Op. Cit., in note 15 (p. 201), pp. 141-172, at p. 141.
35. Ibid. See also Raymond et al, Loc. Cit., in note 25 (p. 204), at p. 133, D.H. Cushing, Marine Ecology and Fisheries, 1975, at p. 25.
36. Tait, Op. Cit., in note 17 (p. 202), at p. 129; see

In addition to nitrate, phosphate and silicate, phytoplankton require other elements such as sulphur, potassium and sodium which are abundant in seawater, and in a lesser degree metals such as iron, calcium, manganese, magnesium, zinc and boron.³⁷ The relation between the above nutrients and phytoplankton is so important that the absence of one can disturb productivity.³⁸ According to Raymond et al, in the case of nitrogen, phosphorous and diatom:

"The demand for these nutrients frequently exceeds the supply. In such cases, the nutrient in shortest supply relative to need becomes the substrate that limits primary production".³⁹

It has already been pointed out that all animal production of the sea is dependent on the production of phytoplankton. This dependence in the case of benthos herbivores is vital and will be discussed in the next Section.

2. Benthic Plants (macro algae)

It has already been mentioned that benthic plants are characteristic of the coastal zone. Like phytoplankton they require radiant energy for photosynthesis and since they are attached to the seabed they can be found only on the continental shelves where the light intensity is sufficient for photosynthesis.⁴⁰ From the biological point of view, their function is twofold: first, they are among

also Cushing, Op. Cit., in note 35 (p. 208), at p. 26.

37. Raymond et al, Loc. Cit., in note 25 (p. 204), at pp. 133-136.

38. Ibid., at p. 133.

39. Ibid.

40. Meadows and Campbell, Op. Cit., in note 11 (p. 200), at p. 85.

those primary producers which are very productive, and secondly, they protect many animal species which in turn are attached to them. From the economic point of view they have been exploited as a resource in many coastal areas for many years.⁴¹

There are two major groups of benthic plants: first, kelp (laminariales) and rockweeds (fucales), and second seagrass and marsh grasses.⁴² Their contribution as primary producers has been estimated by Ryther, according to whom:

"On a global scale, benthic plants account for at least one tenth of the primary production in the seas".⁴³

The coastal zone is considered as a natural refuge of the living resources of the sea. This concept is based on two factors: first, as discussed above, the primary production is much higher in the coastal than it is in the oceanic zone, and secondly, the benthic plants which grow exclusively in coastal waters provide a shelter for many animal species. According to Tait:

"The roots of trees provide a secure substrate for a variety of attached animals, especially barnacles, bivalves, serpulid worms and tunicates. Fish and free-living molluscs and crustaceans find shelter in the crannies between the roots".⁴⁴

41. E.S. Iverson, Farming the Edge of the Sea, 1976, pp. 123-133.

42. Mann, Loc. Cit., in note 24 (p. 204), at p. 226.

43. Ryther, Loc. Cit., in note 27 (p. 205), at pp. 72-76; see also Mann, Loc. Cit., in note 24 (p. 204), at p. 226.

44. Tait, Op. Cit., in note 17 (p. 129), at p. 206.

Yonge also notes that:

"...as a source of food, as a protective blanket against wave action and dessication, and as a surface of attachment, the seaweeds represent a factor of the first importance in the life of the animals of the shore".⁴⁵

a. Economic Importance of Benthic Plants

Some of the biological effects of benthic plants on the ecology of the coastal zone have been discussed above: their relation with benthic animals will be discussed later. Their economic importance as a resource will be examined here.

The exploitation of the red, brown and blue-green algae from which algin, agars and carrageenins are extracted, is rapidly developing. Iversen has described the important uses of benthic plants in the following terms:

"One species of red algae, dulse, consists of about 25 per cent protein, about 44 per cent carbohydrates and 27 per cent mineral salts. Agar, algin and carrageenin are important algae products. Agar a gelling agent, is useful in the home and in the laboratory. Algin, used in ice cream and chocolate milk drinks, has other uses in manufacturing and in laboratories. Carrageenin is used in the food industry as a stabilizer, in drugs such as cough syrups, dental impression material, in cosmetics such as shampoos, and industries such as paper, paint and rubber. These are but a few examples. Most algae contain important minerals and vitamins valuable to the human body".⁴⁶

According to Idyll:

"The mineral and vitamin content of seaweeds make them valuable in the prevention and treatment of deficiency diseases. The crews of whaling ships in the nineteenth century

45. C.M. Yonge, The Sea Shore, 10th Impression, 1975, at p. 83 and pp. 94 and 98; see also Meadows and Campbell, Op. Cit., in note 11 (p. 200), at p. 85.

46. Iversen, Op. Cit., in note 41 (p. 210), at p. 123.

are said to have used them to avoid the effects of scurvy. In modern times, the trace elements of giant kelp have been successfully used to treat such ailments as anaemia, digestive problems, and the disabilities of geriatric patients. An interesting atomic-age use of sodium alginate has been discovered by McGill University biologists. This is to protect people from the effects of eating radioactive strontium, one of the most feared components of nuclear fallout. Strontium 90 can be ingested with milk and can cause leukemia and bone cancer. Sodium alginate eaten as seaweeds can absorb and harmlessly eliminate from the digestive tract up to 93 per cent of the strontium 90. Even after it has reached the bone tissue, up to 25 per cent can be removed, leaving untouched the essential, but chemically-related calcium".⁴⁷

Various uses of alginates in manufactured products are shown in Table 3 (p. 213).

In 1966 only 710,000 metric tons of the seaweeds were exploited. According to Chapman this figure was understated by FAO.⁴⁸ Michanek estimated that the annual world harvest of the benthic plants in the period between 1971-1973 was about 2,107,000 metric tons.⁴⁹ In 1977, the world's total landings of the benthic plants amounted to 1,489,487 metric tons.⁵⁰ At present, algae are farmed in Japan, Korea and the United States.⁵¹

47. C.P. Idyll, The Sea Against Hunger, 1978, at p. 54; for the history of the harvest of seaweeds see Idyll, *ibid*, pp. 47-63, Goran Michanek, Seaweed Resources of the Oceans, FAO, Rome, 1976, Yonge, *Op. Cit.*, in note 45 (p. 211), at p. 322-326.

48. Wilbert McLeod Chapman, "Food from the Sea and Public Policy", in Ocean Resources and Public Policy, *Op. Cit.*, in note 29 (p. 206), at p. 67.

49. Cited by Idyll, *Op. Cit.*, in note 47 (p. 212), at p. 47.

50. FAO's Yearbook of Fishery Statistics, Vol. 44, 1977, at pp. 165-168.

51. Iversen, *Op. Cit.*, in note 41 (p. 210), at pp. 123-133.

Table 3

Some of the manufactured products in which alginates are used*

<u>PHARMACEUTICAL</u> Aureomycin tablets Anti-acid tablets Aspirin tablets Calamine lotion Dental impression compounds Toothpaste Surgical jellies Mineral Oil emulsions	<u>TEXTILES</u> Size for cotton & rayon Textile print pastes <u>PAPER</u> Milk containers Insulation board Food wrappers Acoustic tiles
<u>FOODS</u> Bakery icings Salad dressings & cream Frozen foods Fruit syrups & concentration Candy Milk puddings Ice cream Sherbet Chocolate drinks Sterilized cream Cheese	<u>MISCELLANEOUS</u> Paints Polishes Ceramic glazes Leather ware Boiler compounds Battery plate separators Waxes Jointing cements
<u>RUBBER</u> Latex creaming & thickening Foam rubber, cushions etc... Tyres Electrical insulation	

* The Table appears in C.S. Johnston's Process Chemistry, 1968, at pp 3, 11-14; it is also cited by Perkins, Op. Cit., in note 13 (p. 9), at pp. 395-398.

b. Relationship Between Benthic Plants and Animals

It has already been indicated that biological productivity is based on primary production and the primary production is determined by physical, chemical and biological factors. In addition to the high productivity of phytoplankton in the continental shelves, benthic plants are an important secondary source of primary production in those areas. The relationship between primary production and animal resources will be discussed in the sections dealing with benthic animals but it is appropriate to note here that any disturbance or destruction to any part of an ecosystem, whether natural or man-induced, has a great effect on the other parts of the system. Any reduction in primary production results in a substantial reduction in animal production. The following examples indicate this complex interdependence of various organisms in the ecosystem:

"Along the Pacific coast of California the largest kelp of all, *Macrocystis Pyrifera*, grows in abundance. It is an annual and can grow a staggering 50 metres in length in one season, the frond being buoyed up by small air sacs at the base of each leaf-like branch. The giant kelp is a good and very prolific producer of alginates, and because alginates are important raw materials to such a wide range of things as cosmetics, food and chemicals, the giant kelp forms the slippery basis of a multi-million dollar industry. In the early 1950s all was not well along the coast of California: some of the most productive beds of giant kelp gradually began to go out of production, and the plant began to disappear. Was it over exploitation? Or was it the increasing pollution that cut down the amount of light penetrating to the all important productive and sporeling stages? A team of scientists headed by Dr. Wheeler J. North dived into

action to try to solve the riddle of the disappearing kelp. Their study singled out one main culprit, a spiny sea urchin that feeds voraciously on the plant, chewing through the multiple stalks, just below the holdfast. The question then became: why do they destroy the kelp forests in polluted waters? The answer was a complex one. Coast-line pollution was benefiting the sea urchin population by providing an alternative source of food (they are omnivores, that is, they can eat just about anything that comes their way). At the same time heavy over-fishing of the waters was effectively removing the fish that themselves feed on the urchins. The case of the disappearing kelp thus proves, beyond doubt, that you cannot tamper with any one part of an ecosystem without affecting the delicate balance of the whole living complex"⁵²

Another example of the close relation between benthic plants and animal communities is the following one:

"Simplification of an ecosystem has two immediate consequences, it alters the food chain, which when left undisturbed are usually complex, and it alters the genetic composition of the ecosystem by eliminating various genotype and species of organisms, which modifies the evolutionary processes. For example, in the 1930s, a basic food link was destroyed by eelgrass disease on both sides of the Atlantic. The communities subsisting on this organism disappeared from the area and did not return until their food/or hiding places were restored".⁵³

Finally, the following example given by Mann proves the complexity and interrelationship among benthic plants and some animals:

"An interesting interaction is thought to occur between lobsters, sea urchins and seaweed in the coastal zone of Nova Scotia.

52. David Bellamy, Life Giving Sea, 1973, at p. 53.

53. Bostwich H. Ketcham, The Water's Edge, Critical Problems of the Coastal Zone, 1972, at pp. 38-39.

Sea urchins (*strongylocentrotus*) eat kelp (*laminaria*) and when their population density exceeds a critical level they eat out the seaweed beds, leaving almost bare rock where once had grown luxurious and highly productive kelp forests. Local population explosions of sea urchins occur sporadically in areas where lobster fishing has been carried on intensively. Sea urchins are high on the list of food preference for lobsters (Himmelman and Steele 1971) and the hypothesis has been advanced (Mann and Breen 1972) that there is a balance predator-prey relationship between lobsters and sea urchins, which can be upset by too heavy exploitation of lobster stock. Since, as was mentioned earlier, the productivity of seaweeds is an important factor in the high total productivity of coastal waters, devastation of seaweed beds can have a depressing effect on the level of production in the food chain leading to lobsters".⁵⁴

v. Legal Status of the Primary Producers in the Coastal Zone

Article 2(4) of the 1958 Geneva Convention on the Continental Shelf has recognized the sovereign rights of the coastal States over the benthic plants as living organisms which are permanently attached to the seabed of the continental shelf. Although benthic plants, as mentioned above, are important resources to be exploited, their major importance is the contribution they make to the ecosystem as primary producers. This aspect of benthic plants has not been given any emphasis in the articles on the continental shelf.

Article 5(1) of the above Convention states that:

"The exploration of the continental shelf and the exploitation of its natural resources must not result in any unjustifiable interference with navigation, fishing or the

54. Mann, Loc. Cit., in note 24 (p. 204), at pp. 245-246.

conservation of the living resources of the sea".⁵⁵

There are two important points to be noted in the above article: first, as has already been described there is a close relationship between benthic plants and many fish and shellfish species. Over-exploitation of benthic plants will reduce the total primary production and as the result substantial reduction in the total production of fish and shellfish will follow. The question arises to what extent exploitation or over-exploitation of benthic plants by coastal States can be interpreted as justifiable? It has not been made clear in the article to what extent the exploration of the continental shelf and the exploitation of its natural resources can justifiably interfere with the freedom of fishing in the waters above the continental shelf. Furthermore, in the first example cited above (pp. 214-215) concerning the depletion of kelp, the defects in law governing the rights of coastal and non-coastal States in relation to the continental shelf become apparent. The destruction of kelp was caused by overpopulation of sea urchins and the latter was caused by both pollution and over-exploitation of the fish which feed on sea urchins. The question arises here as to whether a coastal State has the right to exclude non-nationals from fishing in its coastal zone for the protection of kelp? On the other hand, since the water above the shelf is regarded as high seas, can a State whose nationals are engaged

55. Article 5(1), 1958 Geneva Convention on the Continental Shelf.

in fishing in those areas demand that the coastal State take necessary measures to prevent pollution with regard to endangered species, or even more important, to reduce its harvest of benthic plants on the ground that this would increase the stock or stocks of various species which belong to the high seas?

The second point concerns the conservation of the living resources of the continental shelf beyond territorial waters. Article 6 of the 1958 Geneva Convention on Fishing and Conservation of Living Resources of the High Seas states:⁵⁶

"1. A coastal State has a special interest in the maintenance of the living resources in any area of the high seas adjacent to its territorial sea.

2. A coastal State is entitled to take part on an equal footing in any system of research and regulation for purposes of conservation of the living resources of the high seas in that area, even though its nationals do not carry on fishing there.

3. A State whose nationals are engaged in fishing in any area of the high seas adjacent to the territorial sea of a State shall, at the request of that coastal State, enter into negotiations with a view to prescribing by agreement the measures necessary for the conservation of the living resources of the high seas in that area.

4. A State whose nationals are engaged in fishing in any area of the high seas adjacent to the territorial sea of a coastal State shall not enforce conservation measures in that area which are opposed to those which have been adopted by the coastal State, but may enter into negotiations with the coastal State with a view to prescribing by agreement the measures necessary for the conservation of the living resources of the high seas"

56. For the Texts of the Geneva Conventions see Ian Brownlie (ed), Basic Documents in International Law, Second Edition, 1972, pp. 77-111.

It is evident that the special interests of coastal States are recognised in all the provisions of the above article and references are made to "productivity of the living resources" and "living resources" in general. But in practice in spite of the language used in Article 6 regarding those references it is only fish, and to some extent, shellfish resources which fall into the aforesaid provisions. This is clearly evident in the second paragraph of Article 2 of the above Convention which states:

"Conservation programmes should be formulated with a view to securing in the first place a supply of food for human consumption".⁵⁷

This provision is contrary to the rights of coastal States over the benthic plants and, as Crutchfield has rightly pointed out, it would also exclude the rights of coastal States over fish resources which are not used as a food for human consumption. He argues that:

"In any case, it seems clear that the Convention as it now stands includes no concept of net economic yield, however defined, as an objective. The only way in which any economic content can be inferred as an objective is in the peculiar and completely erroneous idea expressed in Article 2 that food usage should have a preferred status. The irrational character of this assumption is beautifully illustrated in the Peruvian anchovetta fishery. Taken literally, the provisions of Article 2 would virtually wipe out the fishery, since the market for anchovetta as a food fish would take only a tiny fraction of the readily available yield. Yet the Peruvian fishery is already

57. Ibid., at p. 98 . The Convention came into force on 20 March, 1966, see Lay et al, New Directions in the Law of the Sea, Op. Cit., in note 19 (p. 12), Vol. I, at p. 353.

exerting a tremendous influence albeit a derived one, on food and other industrial outputs, by providing inexpensive, high grade fish meal, oil and other by-products".⁵⁸

The result of different regimes governing different resources in the highly productive areas of the neritic zones is that the delicate balance of the ecosystem can be interrupted and disturbed according to the interests of either coastal States or non-nationals who are engaged in exploitation of the living resources.

58. James A. Crutchfield, "The Convention on Fishing and Living Resources of the High Seas", Vo. 1, No. 2, Natural Resource Lawyer (1968) pp. 114-125, at pp. 118-119.

B- Benthic Animals of the Coastal Zone

Introduction

Article 2 (4) of the 1958 Geneva Convention on the Continental Shelf defines the living resources of the continental shelf as:

"...living organisms belonging to sedentary species, that is to say, organisms which, at harvestable stage, either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or the subsoil".

The above definition of the living resources of the continental shelf does not correspond to the definition of benthos animals of the seabed and subsoil of the continental shelf which has been adopted by marine scientists. It is over-simplified and imprecise; to separate marine organisms on the basis of locomotion without taking account of other biological factors forming the natural process within an ecosystem is over-simplification. Taking the above definition, it is not clear how the expression "harvestable stage" should be interpreted; is it when a species in question is caught or is it when a species in question has reached a stage of its life when it is commercially best advantageous to catch it?⁵⁹ Furthermore, in order to maintain the biological productivity, the harvestable stage is the period during which the exploitation

59. It will be shown later that certain species belonging to the class crustacea are caught at various stages of their life on the basis of market demands. See below D "Crustacea".

does not hamper the biological productivity of the ecosystem in general and organisms in question in particular.

The two criteria of "immobility" and "constant physical contact with the seabed and subsoil" are also vague and open to serious criticism. The least active animals, i.e. molluscs, include classes such as chitons or coat-of-mail, gastropoda and cephalopoda in which various species of the same class demonstrate different powers of locomotion; some are slow movers and some rapid movers.⁶⁰ Most species of molluscs and crustacea have a free swimming phase in early stages of their lives and, therefore, in order to reach their adulthood, they need to be protected. This protection means both conservation and adjustment of exploitation of different species related to them and other activities related to their natural environment.

Benthos of the coastal zone are closely associated with the seabed and subsoil of the continental shelf to the extent that they have been classified in accordance with the substrata. The benthos of rocky shores have, for instance, different characteristics from the benthos of sandy or muddy shores. This is a distinction which has been made by marine biologists according to different organisms with different ecological surroundings and feeding habits.

By defining the benthos of the coastal zone it will be possible to see whether or not mobility can be

60. See below C "Molluscs" and D "Crustacea".

regarded as a satisfactory criterion as provided in Article 2(4). Furthermore, the extent to which benthos of the coastal zones are associated with the seabed and subsoil of the continental shelf and whether it is practicable to extend the freedom of fishing to these organisms will be examined.

Finally, considering the coastal States' sovereign rights over the seabed and subsoil of the continental shelf, the problem regarding the compatibility of the rights of non-nationals to exploit non-sedentary species with those of coastal States will also be examined.

i. Definition of Benthic Organisms of the Coastal Zone

All organisms which live in or on the seabed and are closely associated with the substrata are termed benthos.⁶¹ This definition is used by marine biologists to distinguish these organisms from plankton (floating organisms) and nekton (swimming organisms) and is based on two factors. First, with a few exceptions, they are the least mobile of all marine organisms, and secondly, they are closely associated with the seabed and subsoil by their feeding habits.⁶²

The first division of benthic organisms, i.e. that

61. The Concise Oxford Dictionary defines the word "benthos" as "flora and fauna found at the ocean bottom", The Concise Oxford Dictionary of Current English, ed. by H.W. Fowler and F.G. Fowler, 5th ed, 1964, at p. 111.

62. See Meadows and Campbell, Op. Cit., in note 11 (p. 200), at pp. 6-7; Tait, Op. Cit., in note 17 (p. 129), at p. 15; Perkins, Op. Cit., in note 13 (p. 9), at p. 161; Mann, Loc. Cit., in note 24 (p. 204) at pp. 226-228.

between benthic plants and benthic animals, has already been mentioned. The benthic animals have been classified by marine scientists in different ways; by their size, their mode of life and their feedings habits. According to Mann:

"A rough and ready division often used by benthic ecologists is: (1) infauna, organisms that live within the bottom deposits, and (2) epifauna, those that live on or above the sea floor. Polychaete worms, burrowing crustaceans and burrowing clams are important components of the infauna, while scallops, starfish, sea urchins and mussels are examples of the epifauna".⁶³

Perkins has described all benthic organisms in the following terms:

"All those animals and plants which live upon the surface of a substratum are referred to as the epifauna and epiphyta respectively. Those animals which live within a substratum are referred to as infauna. Animals which live permanently attached to a substratum, but which do not have a peduncle or stalk, are referred to as sessile, while those animals which are capable of movement, but do so infrequently, are referred to as sedentary. By these definitions, the acron barnacles which are capable of a limited rotational movement can be considered sessile, whereas the mussel, mytilus, which can undertake much greater movements can be considered sedentary. Those animals which move actively and undertake migration during the life span are referred to as the vagile epifauna".⁶⁴

It must be emphasized that in Perkins' definition of sedentary organisms it is the actual movement which

63. Mann, Loc. Cit., in note 24 (p. 204), at p. 228.

64. Perkins, Op. Cit., in note 13 (p. 9), at p. 162.

is regarded as a basis for defining the organisms and not the capacity for movement, while defining the sedentary animals he says "animals which are capable of movement, but do so infrequently". Thus, as will be described later, the majority of organisms belonging to benthos are sedentary; that is to say, they do not by nature or voluntarily use their capacity for swimming.⁶⁵ There remains, however, the problem presented by vagile epifauna which are neither sedentary nor nektonic. Their close association with the seabed and subsoil of the continental shelf is so important for their feeding, spawning and growth that their movements should be examined in the light of their biological processes and not as an independent factor.

Perkins' definitions of benthic animals regarding their mobility are merely definitions and not classifications.⁶⁶ From the legal point of view the difference becomes significant when one attempts to draw a line between the living resources of the continental shelf and those of the high seas. Two major groups of benthic animals, i.e. molluscs and crustaceans represent more than 65,000 and 26,000 described species respectively.⁶⁷ Among them there

65. See below C "Molluscs" and D "Crustacea".

66. As far as it has been possible to ascertain, Perkins is the only marine biologist who has defined the benthic animals on the basis of locomotion although his classifications of marine benthos are not based on their locomotion.

67. Steele, Op. Cit., in note 17 (p. 202), at p. 23.

are some infauna, epifauna and vagile epifauna representing sessile, sedentary and, in some cases, swimming species. There are some generalisations regarding locomotion but these generalisations, as will be shown later, are inadequate and incomplete; they are inadequate because the extent of mobility without considering other biological factors cannot be taken as a criterion for legal definition and they are incomplete because they do not and cannot cover all the species.

On the basis of size, the benthic animals are divided in three groups: 1. Macrobenthos, 2. Meiobenthos and 3. Microbenthos. Although the second and third groups of benthos are very important in the study of biological productivity, we shall discuss only the macrobenthos of the coastal zones because of their importance as a food resource and the emphasis will be above all on molluscs and crustaceans.

ii. Distribution of Benthic organisms of the coastal zone

It is estimated that more than 80% of the total biomass (weight of organic materials in living organisms) of benthic animals exists in depths less than 200 metres.⁶⁸ The productivity of the benthic animals in the coastal zones is due to several factors among which the high productivity of the primary producers is eminent. Another factor is the shallowness of the coastal zones; i.e.

68. Schaefer, Loc. Cit., in note 14 (p. 9).

the presence of the shelf, for benthic animals living on the seabed or below the surface rely almost entirely on the supply of food from above (photic zone, where photosynthesis occurs). It was mentioned earlier that photosynthesis occurs throughout the ocean but due to lack of nutrients such as nitrate and phosphate productivity below a depth of 200 metres is very low. The availability of the nutrients in the coastal zones is due to the proximity to land on the one hand and on the other to the fact that the shallowness of the ocean prevents the loss of organic matter. According to Mann there are three factors contributing to the abundance of benthic animals in the coastal waters; they are as follows:

"(1) Phytoplankton production is higher in coastal waters than further offshore; (2) the distance through which material has to sink, and hence the opportunity for it to be consumed in the water column is less; and (3) there is lateral transport from the areas of intensely high primary productivity in seaweeds and coastal marshes".⁶⁹

According to Belyaev and Uschakov, the average figures for the biomass of benthic animals for the Indian sector of the Antarctic, for example, are shown in Table 4 below: ⁷⁰

Table 4

Depth Metre	Total Biomass
100 -200	1347 gm -2
200 -500	239 gm -2
500 -1000	43 gm -2
1000 -3200	13 gm -2

69. Mann, Loc. Cit., in note 24 (p. 204), at p. 231.

70. Cited by Mann, *ibid*, at p. 232.

The total biomass of benthic fauna in the world ocean has been estimated by Zenkevitch. This estimate which is given by Mann does not include the population of the intertidal zone (see Table 5).⁷¹

Table 5

Depth (m)	Area (km) ² x 10 ⁶	%	Mean Biomass g(m) ⁻² or t(km) ⁻²	Total Biomass t x 10 ⁶	%
0-200	27.5	7.6	200	5500	82.6
200-3000	55.2	15.3	20	1104	16.6
3000	278.3	77.1	0.2	56	0.8
Whole ocean	361	100	18.5	6660	100

Having defined the benthic animals and established the fact that these organisms are generally inhabitants of the coastal zones, it remains to see to what extent it is possible to apply different legal regimes to different species. The current legal definition of the living resources of the continental shelf which is based on the mobility criterion cannot be supported since it is not practically applicable.⁷² Perhaps the best solution to the problem of defining the living resources of the continental shelf would be to study the species; their feeding habits, their interrelationship and their association with the seabed. The problem as seen by marine scientists is not who gets what but who can get what over a long period without disturbing the whole ecosystem. This is increasingly

71. Ibid., at p. 233; see also Meadows and Campbell, Op. Cit., in note 11 (p. 200), at pp. 90-92.

72. It will be discussed later that the definition of

becoming also a problem for lawyers as States endeavour to manage ocean resources on a more ecological basis in the light of growing scientific knowledge and to prevent the depletion of many species to which the existing legal regimes have contributed.

Among all the benthic animals, species belonging to phylum mollusca⁷³ and the class crustacea⁷⁴ are the most important since between them they comprise almost all the commercially valuable resources of the coastal zone; they are also subject to controversial views regarding their legal status. In the next two Sections the biological factors related to their life cycle, their economic importance and their legal status will be discussed.

living resources of the continental shelf as adopted in Article 2(4) of the 1958 Convention on the Continental Shelf has appeared without any change in the Texts which have, so far, been provided by the UNCLOS III.

73. Phylum is defined as "division of animal kingdom containing classes of animals", The Concise Oxford Dictionary, 5th ed, 1964, at p. 914.
74. The class Crustacea belongs to phylum Arthropoda, see below D "Crustacea".

C- Molluscs

Introduction

As discussed in the previous Chapter, the definition of sedentary species introduced by the six powers during the UNCLOS I Fourth Committee's debates on the continental shelf originally included a phrase which read:

"...but crustaceans and other swimming species are not included in this definition".⁷⁵

Referring to the definition of sedentary species in Article 2(4) Richard Young maintained that:

"...of the creatures important to man only the crustaceans still seem to be in an uncertain position".⁷⁶

No mention was made either in the articles on the continental shelf and the conservation of the living resources of the high seas or by other authorities of clarifying the legal status of the species belonging to molluscs.

The phylum molluscs includes many commercially important species such as sea-snails, limpets, winkles, whelks, cockles, oysters, mussels, scallops, cuttlefish, squid and octopus. These and many other lesser known species

75. 1958 Geneva Conference, Official Records, Vol. VI, at p. 143. UN. Doc. A/Conf. 13/42.

76. Richard Young, Loc. Cit, in note 145 (p. 172), at p. 368.

are not from the same class and, therefore, do not exhibit the same characteristics. The phylum is subdivided into seven classes which differ greatly from one another both in form and habits.⁷⁷ These differences are not confined to molluscs but extend to other commercially important species of other phyla such as porifera (sponges), arthropoda (crustacea) and echinodermata (sea-cucumbers and sea-urchins).

Phylum mollusca is the second largest phylum in the animal kingdom and comprises over 65,000 described living species.⁷⁸ The phylum is divided into seven classes:⁷⁹

1. Gastropoda (snails and slugs, chanks and limpets).
2. Bivalvia (oysters, mussels etc...).
3. Cephalopoda (squids, octopuses).
4. Polyplacophora (chitons).
5. Scaphopoda (tusk shells).
6. Alpacophora.
7. Monoplacophora.

The first three classes comprise all the commercially important species of mollusca and, therefore, we shall concentrate on various aspects of these classes bearing in mind the problems concerning their legal status.

-
77. Barry Fell, Introduction to Marine Biology, 1975, at p. 213. See also Campbell, Op. Cit., in note 23 (p. 204), at pp. 138-139.
78. Robert D. Barnes, Invertebrate Zoology, third ed, 1975, at p. 317. In addition to the living animals, there are also some 35,000 fossil species, *ibid.*
79. *Ibid.*, pp. 317-431; see also W.D. Russell-Hunter, A Biology of Lower Invertebrates, 1968, pp. 112-113.

i. Gastropoda

1. Locomotion: Gastropoda is the largest class of molluscs with over 35,000 described species.⁸⁰ Although it is the largest class of molluscs its exploitation is limited to a few species including sea-snails, limpets, abalones, whelks, winkles, slipper-shells and chanks.

Campbell referring to the mobility of the gastropods stated that:

"It is divided into three subclasses, all of which move on a flattened foot. The first of these is the prosobranchia (limpets, winkles, whelks etc...). These are familiar seashore animals and although not swiftly moving, they search actively for their food".⁸¹

According to Barnes:

"The typical gastropod foot is a flat creeping sole similar to that of the ancestral molluscs, but it has become adapted for locomotion over a variety of substrata".⁸²

Yonge, while referring to different classes of gastropod, notes that:

"The commonest are marine snails with a unival shell which typically crawl on a broad foot, hence their scientific name of gastropod or stomach-footed".⁸³

80. Barnes, Op. Cit., in note 78 (p. 231), at p. 322.

81. Campbell, Op. Cit., in note 23 (p. 204), at p. 139.

82. Barnes, Op. Cit., in note 78 (p. 231), at p. 338.

83. Yonge, Op. Cit., in note 45 (p. 211), at p. 49.

There are, however, small groups of gastropods which appear in sessile form. In contrast, a swimming pelagic existence is also demonstrated by a few species of gastropods, namely heteropods and opisthobranchs (sea-slugs and sea-hares).⁸⁴

2. Nutrition and habitat: The feeding habits of gastropods vary immensely. Barnes states that:

"...virtually every type of feeding habit is exhibited by gastropods. There are herbivores, scavengers, deposit feeders, suspension feeders, and parasites".⁸⁵

Nevertheless, gastropods are mainly herbivores, feeding on phytoplankton and benthic plants. Herbivore gastropods include some familiar species such as abalones, limpets and periwinkles.⁸⁶ Whelks are carnivores feeding upon bivalve molluscs, other gastropods and echinoderms.⁸⁷

3. Economic importance of gastropods: As the largest class of molluscs the economic importance of gastropods is twofold. First, their indirect contribution to the biological productivity of the coastal zone as zooplankton, and, secondly, their direct exploitation.

Gastropods generally inhabit the shallow waters especially in near and middle shore. In this respect they serve as food for many demersal species and other molluscs and crustaceans.⁸⁸ Barnes states that:

84. Barnes, Op. Cit., in note 78 (p. 231), at p. 339.

85. Ibid., at p. 341.

86. Ibid., at pp. 344-346; see also Fell, Op. Cit., in note 77 (p. 231), at p. 215.

87. Barnes, Op. Cit., in note 78 (p. 231), at p. 347.

88. Steele, Op. Cit., in note 17 (p. 202), at p. 24.

"Gastropods serve as food for numerous other animals, particularly as veliger larvae and newly settled young; but the principal predators of aquatic gastropods are fish, aquatic birds and mammals, many of which are adapted to a molluscan diet".⁸⁹

Various species of gastropods are also being exploited for human consumption and much use is also being made of their by-products. Among these species abalones, whelks, periwinkles and winkles are the most important. The total production of various species of gastropods, according to the FAO's estimation was 42.3 (catch in '000 of tonnes live weight) in 1958 and reached 51.5 in 1968.⁹⁰ The total catch of gastropods rose to 69,628 metric tonnes in 1977.⁹¹

Among the various species of gastropods the abalones and conches, both herbivores, are commercially the most important. Japan, Mexico and the United States are the major exploiters of abalones. In Mexico, abalone is the second largest export after shrimps. They are primarily gathered by divers for export and the industry is not as developed as it is in Japan and the United States.⁹²

Abalones are extensively farmed in Japan and the United States.⁹³ Referring to the farming of abalones in the United States in the early 1970's, Hansen stated that:

-
89. Barnes, Op. Cit., in note 78 (p. 231), at p. 365; see also Mann, Loc. Cit., in note 24 (p. 204), at p. 249.
90. The Fish Resources of the Ocean, edited by J.A. Gulland, 1971, at pp. 199-200.
91. FAO's Yearbook of Fishery Statistics, Catches and Landings, Vol. 44, 1977, at p. 137.
92. W.S. Novak, The Marketing of Shellfish, 1970, at pp. 201-205.
93. Iversen, Op. Cit., in note 41 (p. 210), at pp. 177-178.

"Today abalones are extensively farmed in Japan. In 1971, about 16 fisheries prefectural stations there provided young abalones for sale to farmers for planting in natural areas. In some areas, these stations produce two to three million abalones per year".⁹⁴

Milne, while discussing the potential value of some molluscs states that:

"The abalone like the scallop is also of potential economic value, and since there is a heavy demand for the northern Japanese abalone, *haliotis discus*, cultivation attempts are in progress in Japan. At present, the abalone are artificially spawned in hatcheries, and seed sown in coastal areas for stocking. If the warm water effluent from coastal power stations was utilised this could increase its commercial prospects".⁹⁵

Other gastropods, such as whelk and periwinkle, are currently exploited in many coastal waters, but unfortunately they are under-exploited for marketing reasons. In 1970 the total landing of the above two species from the North Sea amounted to only 3,225 metric tonnes.⁹⁶

4. Legal status of gastropods: Of all the commercially important species of gastropods, none is an active swimmer although, as discussed earlier, they all possess certain powers of locomotion.

In October, 1968, the Ministry of Fisheries of the USSR issued a list of 52 species which would be regarded as the living resources of the continental shelf. The list

94. J.A. Hanson, "Concentrating and Harvesting Marine Crops", in Open Sea Mariculture, Op. Cit., in note 12 (p. 8), pp. 237-260, at p. 251.

95. John H. Bailey, Sea Frontier, 1973, at pp. 148-153.

96. P.H. Milne, Fish and Shellfish Farming in Coastal Waters, 1972, at pp. 47-48.

excluded all forms of swimming gastropods (pteropoda) and specifically mentioned the following species:

- " D. Gastropod molluscs, except for forms which are capable of swimming when mature (order of Krylonogii - Pteropoda
- 22. Neptunei (species of genus Neptunea)
- 23. Whelks (species of genus Buccinum)
- 24. Rapany (species of genus Rapana) ".⁹⁷

The United States has also considered 31 species of benthos as the natural resources of the continental shelf.⁹⁸ Although the Bartlett Act, Prohibiting Foreign Fishermen from Harvesting the Continental Shelf Fisheries, came into force in May, 1964, it took the Department of the Interior 4 years to issue a list of 16 species.⁹⁹ The Act was revised twice in 1971 and the revised list included another 10 species.¹⁰⁰ In 1974 the Offshore Shrimp Fisheries Act added a few more species to the list; bringing the total number of species to 31.¹⁰¹ The following gastropods are included in the list:

- "22. Red Abalone -*Haliotis rufescens*;
- 23. Pink Abalone - *Haliotis corrugata*;
- 24. Japanese Abalone - *Haliotis Kamtschatkana*;
- 25. Queen Conch - *Strombus*".¹⁰²

-
- 97. Soviet Statutes and Decisions, Spring, 1970, at p. 283.
 - 98. 15 ILM (1976), at p. 637.
 - 99. 33 Fed. Reg. 16114 (1968).
 - 100. 36 Fed. Reg. 11923 (1971).
 - 101. 39 Fed. Reg. 20381 (1974); 13 ILM (1974) at p. 1214.
 - 102. The same list appeared in the Fisheries Conservation Act 1976, see 15 ILM (1976), at p. 637. For further discussion regarding the United States' policy on the living resources of the continental shelf see Eugene R. Fidell, "The Case of the Incidental Lobster: United States Regulation of Foreign Harvesting of Continental Shelf Fishery", Vol. 10, No. 1 International Lawyer (1976) pp. 135-154.

ii. Bivalvia (Lamellibranchia)

1. Locomotion: The class bivalvia represents some 30,000 species and is commercially the most important group of benthos.¹⁰³ It includes some extensively exploited species such as oysters, mussels, scallops, clams and cockles.¹⁰⁴

From the point of view of mobility the class bivalvia can be divided into two groups. First, species which have very little power of locomotion: these include soft bottom burrowers (infauna), attached surface dwellers (epifauna) and boring bivalves which have the ability to penetrate and live beneath hard surfaces.¹⁰⁵ They do not move around and their mobility power is used only for burrowing. Both mussels and oysters are familiar species of bivalvia which can be regarded as true sedentary organisms.¹⁰⁶ Second, species which are not attached or attached only weakly, although they are surface dwellers, such as scallops, file shells and cockles. Their moving ability has been described by Barnes as follows:

"Free-living file shells and scallops have evolved the ability to swim by rapid ejection of water from the mantle cavity with the clapping of the valves".¹⁰⁷

Scallops move both vertically and horizontally.¹⁰⁸

-
103. Campbell, Op. Cit., in note 23 (p. 204), at p. 139;
Russell-Hunter, Op. Cit., in note 79 (p. 231), at p. 138.
104. Campbell, Op. Cit., in note 23 (p. 204), at pp. 168-189.
105. Barnes, Op. Cit., in note 78 (p. 231), at pp. 385-398.
106. Ibid., at p. 376. 107. Ibid., at p. 393.
108. Yonge, Op. Cit., in note 45 (p. 211), at pp. 194-196;
Russell-Hunter, Op. Cit., in note 79 (p. 231), at p. 143.

Yonge, after describing the vertical movements of scallops, mentions their horizontal movements and states:

"...the scallops move about freely. We know that they migrate because they are not found in the same regions throughout the year, but we are uncertain exactly how far they can move. They can also execute other movements. When lying quietly on the bottom they may be stimulated into sudden activity by the approach of enemies".¹⁰⁹

In fact, it must be emphasized that most unattached surface dwellers use their swimming ability only when they are disturbed.¹¹⁰ Cockles and some species of clams also move about freely.¹¹¹

2. Nutrition and habitat: The majority of bivalves are filter feeders feeding on phytoplankton. This includes razor clams, cockles, scallops, mussels and oysters.¹¹² There are, however, two smaller groups of bivalves, namely protobranchs and septibranchia: the former are mainly deposit feeders while the latter are carnivores or scavengers.¹¹³

109. Yonge, Op. Cit., in note 45 (p. 211), at p. 194.

110. According to Barnes "The swimming ability of scallops and file shells is used primarily to escape predators or other sudden disturbing conditions". Barnes, Op. Cit., in note 78 (p. 231), at p. 394.

111. Ibid., at p. 388; Yonge, Op. Cit., in note 45 (p. 211), at pp. 276-278 and pp. 258-259.

112. Describing the nutrition requirements of molluscs Raymond et al stated that: "...the most important nutritional mode available to molluscs is the herbivorous mode. Oysters, clams and mussels can be raised exclusively upon phytoplankton foods...". Loc. Cit., in note 25 (p. 204), at p. 144; see also Barnes, Op. Cit., in note 78 (p. 231), at p. 383.

113. Ibid., at pp. 376 & 385; Russell-Hunter, Op. Cit., in note 79 (p. 231), at p. 137.

Bivalves are generally inhabitants of the continental shelf for the reasons explained earlier.¹¹⁴ The epifauna bivalves are usually found on substrata consisting of sand or gravel. The infauna bivalves are usually found in the soft bottom.

3. Economic importance of bivalves: Bivalves are the most extensively exploited species of all benthic animals. In 1958 the world's landing of all molluscs amounted to 1,462,000 metric tonnes (live weight) but had increased to 2,174,800 metric tonnes by 1969.¹¹⁵ That figure rose to 3,391,000 metric tonnes in 1974¹¹⁶, and reached 4,021,995 metric tonnes in 1977.¹¹⁷ According to the FAO's Yearbook on Fishery Statistics the total catch of bivalves in 1977 amounted to 2,653,770 tonnes.¹¹⁸

The economic importance of bivalves can be viewed from two different aspects. First, there has been a gradual increase in the harvesting of oysters and clams while a more substantial increase has been taking place regarding mussels.¹¹⁹ Secondly, there has been a substantial increase in the catch of scallops, cockles and arkshells. Regarding

114. See above pp. 226-229.

115. Gulland, Op. Cit., in note 90 (p. 234), at pp. 199-203.

116. Idyll, Op. Cit., in note 47 (p. 212), at p. 14.

117. FAO's Yearbook of Fishery Statistics, Vol. 44, 1977, at pp. 136-149.

118. The total catch of oysters was 878,582 metric tonnes; the total catch of mussels was 539,426 metric tonnes; the total catch of scallops was 405,391 metric tonnes (in 1974 it was 238,413) and clams, cockles and arkshells was 830,378 metric tonnes. Ibid, at pp. 138-145.

119. In 1974 the total catch of mussels was 375,816 metric

the first point, while the world's landing of oysters has remained relatively stable in the past two decades there has been a substantial increase in the harvesting of other bivalves. This is due to the participation of more nations in the catch of these species on the one hand and the farming of some species such as mussels and clams on the other.¹²⁰

The mussel mytilus edulis, for instance, is farmed in France, Spain, Holland and Italy.¹²¹ The farming of mussels is conducted by means of ropes suspended from floating rafts.¹²² Successful cultivation of mussels by Spain and Norway by this technique in recent years has prompted other countries to employ the same method.¹²³ In Spain the mussel industry has progressed since 1946 to the extent that it has become one of the most important industries in that country.¹²⁴

4. Legal status of bivalves: Among commercially important bivalves three species, i.e. oyster, mussel and clam can be regarded as sedentary and, therefore, subject to coastal States' sovereign rights over their exploitation within the limit of the continental shelf.

tonnes and rose to 539,426 in 1977. Ibid, at p. 141.

120. Iversen, Op. Cit., in note 41 (p. 210), at pp. 134-177; see also Milne, Op. Cit., in note 96 (p. 235), at pp. 125-137.

121. Milne, Op. Cit., in note 96 (p. 235), at p. 18.

122. Ibid., at pp. 132-133.

123. Ibid.

124. Milne notes that "Spain is now (1972) the world's leading producer of mussels, marketing some 150,000 tonnes per annum". Ibid., at p. 18. In 1976 the annual production of mussels in Spain rose to 220,000 tonnes. Iversen, Op. Cit., in note 41 (p. 210), at p. 171.

The only legal problem concerning the above species is the farming of some of them. Milne, describing the mussel culture in Spain, states that:

"The Galician rias selected for mussel culture are similar to the Norwegian Fjords, in that they are long, up to 25 km, and narrow, 3-12 km wide, with depth ranging 30 to 60 m. Raft culture is, however, confined to areas 3-10 m deep due to problems of mooring".¹²⁵

If the problems such as mooring are overcome it is inevitable that the industry will not hesitate to conduct operations in greater depths. These greater depths could mean areas outside the territorial sea where the water covering the continental shelf is regarded as high seas. Article 3 of the 1958 Geneva Convention on the Continental Shelf states:

"The rights of the coastal States over the continental shelf do not affect the legal status of the superjacent waters as high seas, or that of the air space above those waters".

On the other hand, the exploration of the continental shelf and the exploitation of its natural resources according to Article 5(1) of the above Convention "must not result in any unjustifiable interference with navigation, fishing or the conservation of the living resources of the sea,...". The question arises here as to whether farming of sedentary species beyond the limit of the territorial waters can be interpreted as exploiting the natural resources of the continental shelf? If so, the simple conclusion is that

125. Milne, *Op. Cit.*, in note 96 (p. 235), at p. 132.

coastal States may, in the process of farming, justifiably interfere with navigation, fishing and the conservation of living resources beyond their territorial waters. It seems from the wording of Article 2(4) of the Convention on the Continental Shelf that at the time of exploitation, the living organisms must be "either immobile on or under the seabed" or "unable to move except in constant physical contact with the seabed or subsoil"; and, therefore, if farming is conducted by floating rafts beyond the limit of the territorial waters it cannot be interpreted as exploiting the living resources of the seabed and subsoil. Thus farming by floating rafts beyond the territorial waters is subject to the provisions of the 1958 Geneva Convention on the High Seas.¹²⁶

As discussed earlier, some commercially important species of bivalves, such as scallops, cockles and file shells are quite active and capable of swimming and cannot be regarded as sedentary species. The only references to bivalves in the United States list of continental shelf fisheries are to surf clams (*spisula solidissima*) and soft clams (ocean quahag)¹²⁷ No comment is made regarding other species. On the other hand, the list of the continental shelf fisheries of the USSR includes 13 species of bivalves including active scallops. The list includes the following species:

126. See Articles 1 and 2.

127. 15 ILM (1976) at p. 637.

- "C. Bivalve molluscs (Bivalvia) used to produce edible products, or proteins, fertilizers, calcareous meals, etc.....
9. Oysters (species of genus ostra, crasostrea, pododesmus)
 10. Mussels (species of genus mytilus, crenomytilus)
 11. Modioly (species of genus modiola)
 12. Muskulusky (species of genus musculus)
 13. Scallops (species of genus chlamys, pecten, patinopecten)
 14. Leda (species of genus leda)
 15. Ioldiia (species of genus yoldia, megayoldia, cresterium)
 16. Maktry (species of genus mactra, spisula)
 17. Kardiumy (species of genus cardium, serripes, cerastoderma)
 18. Venusy (species of genus venus, liocyma)
 19. Makumy (species of genus macoma, tellina)
 20. Silkuy (species of genus siliqua, solen)
 21. Mii (species of genus mya)".128

The legal problem concerning non-sedentary species of bivalves is very important on two grounds: first, since these species are mobile and capable of swimming they cannot be regarded as sedentary according to Article 2(4) of the Convention on the Continental Shelf. In this respect the inclusion of scallops in the list of the continental shelf fisheries by the USSR is contrary to the provisions of the aforesaid article. Secondly, the farming of scallops and the way it is carried out raises some legal problems which can be described as follows: after spawning, the young spat usually settles on the fronds of the seaweeds and is attached there for about a month after which it detaches itself and becomes an inhabitant of the seabed. At this stage the young spat can be collected for artificial cultivation. Two questions arise here as to (1) whether

128. Soviet Statutes and Decisions, Spring 1970, at p. 283.

coastal States can legally exploit the seaweeds while young scallops are attached to them and (2) whether the collection of young scallops for farming, from the seabed beyond the limit of the territorial waters, is legal? In the first instance the wording of Article 5(1) of the Convention on the Continental Shelf is open to various interpretations since it is not clear to what extent the exploration of the continental shelf and the exploitation of its natural resources must not result in any unjustifiable interference with fishing or the conservation of the living resources of the sea. In the second instance, it seems clear that coastal States, by virtue of Article 2(4) are not entitled to exploit species which have not reached their 'harvestable stage' and thus must not cut short the natural processes of species which are considered as belonging to the high seas.

The farming of scallops is under experiment in Japan and the USSR.¹²⁹ In the United States the scallop fisheries are expanding very rapidly and production has

129. According to Hanson "Experiment in culturing scallops are underway in Japan and the USSR. The Russians are working with forms that are naturally free living on sand bottom. The Japanese, on the other hand, are experimenting with means of containing or attaching the animals to ropes, as is done with oysters. With modifications, it would appear that the subsurface clam grower might be applied to freeliving scallops culture as well. If the device will work for clams, it seems that scallops culture could be achieved by adding external netting to prohibit the escape of these erratically swimming molluscs". Loc. Cit., in note 94 (p. 235), at pp. 250-251; see also Iversen, Op. Cit., in note 41 (p. 210), at pp. 174-177 and Milne, Op. Cit., in note 96 (p. 235), at p. 127.

increased 12-fold since the war.¹³⁰ The market demand is so high that 76 per cent of Canadian scallops are exported to the United States.¹³¹

It must be emphasised that since 1973 the Third United Nations Conference on the Law of the Sea (UNCLOS III) has been in progress and since it is likely that on the basis of the Texts provided so far a comprehensive treaty will replace the 1958 Geneva Conventions, some of the provisions of the new Texts relating to the exploitation of natural resources of the continental shelf will be discussed at the end of this Chapter.¹³²

130. Novak, *Op. Cit.*, in note 92 (p. 234), at p. 173

131. *Ibid.*, at pp. 190-191. Novak notes that:
"...a substantial increase in the scallop fishery and the scallop trade has occurred since 1959, but only 21 per cent of the total landings is actually consumed in Canada. In some years, scallop vessels have been sent from Nova Scotia to fish as far away as Mexico", *ibid.*

132. For the development of the Law of the Sea between 1958 and 1973 see below Chapter IX. For the Third United Nations Conference on the Law of the Sea and state practice see below Chapter X.

D- Crustacea

Introduction

Phylum arthropoda, with at least three-quarters of a million described species, is the largest of all phyla.¹³³ The phylum is divided into 10 sub-phyla and classes among which the crustacea are the only large class of arthropods which are primarily aquatic.¹³⁴

The crustacea are economically important for two reasons. First, the bigger crustacea, i.e. malacostracans, which include various species of crabs, lobsters, shrimps and prawns, form, together with molluscs, what is known as the shellfish industry. Secondly, the smaller crustacea (such as copepods) are permanent members of zooplankton (holoplankton) and very important to the food chain.¹³⁵ The direct and indirect economic importance of the class crustacea will be discussed later.

The biological aspects of the class crustacea which determine their legal status, i.e. locomotion, nutrition

habitation are extremely diverse. According to Barnes:

"The ancestral crustaceans were probably small swimming epibenthic suspension feeding animals and some modern forms have retained this primitive existence..... The majority of crustaceans have taken up a crawling habit. Although some swimming ability is often retained, certain appendages have usually become heavier and adapted to crawling and burrowing".¹³⁶

Crustaceans also exhibit a great range of diets and

133. Barnse, Op. Cit., in note 78 (p. 231), at p. 434.

134. Ibid., at p. 510; see also Russell-Hunter, A Biology of Higher Invertebrates, 1969, at p. 10.

135. Russell-Hunter, Aquatic Productivity, Op. Cit., in note 17 (p. 202), at pp. 58-60.

136. Barnse, Op. Cit., in note 78 (p. 231), at p. 511.

feeding habits. As well as suspension feeders eating plankton and detritus, there are scavengers, herbivores and carnivores. There are also several groups of parasitic crustacea.¹³⁷

To clarify the legal status of the class crustacea it is best to look at the mobility, feeding habits and habitat of individual species in order to determine what species can be regarded as sedentary and thus resources of the continental shelf according to Article 2(4) of the 1958 Geneva Convention on the Continental Shelf.

The class crustacea includes over 26,000 species and is divided into 8 major sub-classes, viz. 1. Cephalocorida, 2. Branchiopoda, 3. Ostracoda, 4. Mystacocarida, 5. Copepoda, 6. Branchiura, 7. Cirripedia, and 8. Malacostraca.¹³⁸

The exploitation of crustaceans is confined to various species belonging to the sub-class malacostraca which is also by far the largest group consisting of over 18,000 species.¹³⁹ Malacostraca consists of 13 orders among which Decapoda with 8,500 species is the most important. The order contains all the familiar commercially important species such as prawns, shrimps, crayfish, lobsters and crabs. Species belonging to Decapoda are extremely diverse

137. Ibid., at pp. 511-514.

138. Ibid., at pp. 521-522; Russell-Hunter, Op. Cit., in note 134 (p. 246), at p. 58.

139. Barnes, Op. Cit., in note 78 (p. 231), at p. 521. Other sub-classes consist of fewer species for example Cephalocordia (4 species), Branchiopoda (800 species), Mystacocarida (3 species), Branchiura (75 species), and finally Cirripedia or Barnacles present some 900 species. For further details see Barnes, *ibid*, at p. 521 and Campbell, Op. Cit., in note 23 (p. 204) at pp. 196-199.

regarding their mobility and habitation. As well as active swimmers like prawns and shrimps the order contains many species of crab which do not swim at all, their mobility being based on crawling. In addition, there are lobsters and a few crabs which combine the two means and while their locomotive power is crawling they are capable of swimming.¹⁴⁰

On the above basis the order decapoda is divided into two sub-orders: i. Natantia, ii. Reptantia.

i. Natantia

1. Locomotion: The sub-order Natantia includes all prawns and shrimps such as snapping prawn, common prawn, chameleon prawn and common shrimp. The name natantia which means 'swimming' is used to indicate that there are essentially swimming species.¹⁴¹ Barnes, referring to their swimming ability, notes that:

"There are some pelagic and bathypelagic shrimp (in fact they are the only pelagic decapodes), but most shrimps are bottom dwellers that swim intermittently. The pleopods, which are large and commonly fringed, are the principal swimming organs although rapid ventral flexion of the abdomen with the tail fan is used for quick backward darts".¹⁴²

2. Nutrition and habitat: Most species belonging to natantia are benthic and found in all sorts of bottom habitats.¹⁴³ Chameleon prawn are usually found on the lower shore down to a depth of 100 metres and are associated with rocks and seaweeds.¹⁴⁴ Snapping prawns (*alpheus ruber*)

140. Barnes, Op. Cit., in note 78 (p. 231), at pp. 579-580.

141. Campbell, Op. Cit., in note 23 (p. 204), at pp. 210-213; Barnes, Op. Cit., in note 78 (p. 231), at p. 580.

142. Ibid., at p. 580.

143. Ibid.

144. Campbell, Op. Cit., in note 23 (p. 204), at p. 210.

live at depth from 30 to 100 metres and often in soft substrates and among benthic plants.¹⁴⁵ Another species of snapping prawn (*synalpheus lacvimanus*) lives in shallower water (15-30 metres) and is "sometimes associated with plants or animals".¹⁴⁶ *Leander squilla* (prawn), *leander serratus* (common prawn) and *leander adpersus* (prawn) all are found in "rockpools on the lower shore, often among seaweeds also in shallow water".¹⁴⁷

Natantians migrate both vertically and horizontally.¹⁴⁸ Vertical migration occurs every night. Shrimps which usually spend the whole day buried under the sand, and prawns which are usually on rocks or among seaweeds make their way toward the surface after the sunset and return to the seabed just before dawn.¹⁴⁹

The horizontal migration occurs once a year. Many crustaceans, including natantia, come inshore in the summer and return to deeper waters during winter. Spawning takes place at depth between 8 to 26 fathoms well offshore.¹⁵⁰ After going through many critical stages during the first three weeks of life the young shrimp enter the post larval stage. The horizontal migration of natantians which plays a significant role in determining their legal status, has been described by Iversen in the following terms:

145. Ibid.

146. Ibid.

147. Ibid.

148. Yonge, Op. Cit., in note 45 (p. 211), at p. 16.

149. Ibid., at p. 254.

150. Iversen, Op. Cit., in note 41 (p. 210), at p. 183; see also Perkins, Op. Cit., in note 13 (p. 9), at p. 167.

"At about three weeks of age it next passes into post larval stages and is about 100 miles from where it hatched. These weak swimmers, capable of only limited vertical movement, make a significant journey, apparently without much effort on their part, into a nursery area (estuarine or shallow in-shore bays)... Once inside the nursery grounds they bury themselves during the day in the soft bottoms where they find protection from predatory fishes as well as abundant food for rapid growth. After an unknown time, perhaps three to six months in the nursery area, the young juveniles, now about 7.5 centimetres (3 inches) long, retrace their earlier route which led them to the nursery areas. They ride the ebbing tidal current back to the sea, growing and maturing as they move toward the deeper water on the continental shelf. Here they reach maturity, spawn and the circle is completed".¹⁵¹

The juvenile stages of many natantia require a herbivorous diet and brine shrimp (*artimia salina*) remains a herbivore throughout its life.¹⁵² Apart from brine shrimp, the rest are mainly scavengers; their diet depends on the availability of the food.¹⁵³

3. Economic importance of natantia: As a source of protein, compared with fish and molluscs, crustaceans in general are less significant in terms of quantity. On the other hand, in terms of cash value, they are one of the most important species. The latter aspect is particularly noticeable in various species of natantia. The weed shrimp (*penaeus japonicus*) known as Kuruma has a great

151. Iversen, Op. Cit., in note 41 (p. 211), at p. 184.

152. C.E. Nash, "Crop Selection Issues", in Open Sea Mariculture, ed. by Hanson, Op. Cit., in note 12 (p. 8), pp. 183-210, at p. 191.

153. Yonge, Op. Cit., in note 45 (p. 211), at pp. 108 and 255. According to Yonge "Little that is edible comes ammis to shrimps and the diet varies throughout the

market in Japan.¹⁵⁴

The world's total landings of natantia which amounted to 502,000 metric tonnes in 1958 rose to 771,000 metric tonnes in 1968.¹⁵⁵ This figure increased to 1,446,188 metric tonnes in 1977.¹⁵⁶ As can be seen, the world's total landings of natantia have doubled in the past 10 years and yet the production has not been able to meet the market demands.

The demand for shrimps and prawns has caused extensive studies into the feasibility of farming these species on a commercial scale. Kuruma, however, has been successfully raised in Japan but it has not yet been cultivated with any great success elsewhere.¹⁵⁷

Although natantia are very fast growing species which

the year. At times the stomach can be seen through the translucent body packed with ingested green plants, at others the food may be exclusively animal and include smaller crustaceans, molluscs, eggs and young stages of fish and even relatively large worms". Ibid.

- 154. Idyll, Op. Cit., in note 47(p. 212), at p. 83.
- 155. Gulland, Op. Cit., in note 90 (p. 234), at pp. 240-241.
- 156. FAO's Yearbook of Fishery Statistics, Vol. 44, 1977, at pp. 129-132.
- 157. According to Idyll the success of the Japanese in farming the weed shrimp or kuruma is their value; he notes that:
"The price of live kuruma shrimp in Japan has reached astonishing levels. In early 1976 the average price received by one farm was \$/10.70 per pound. At certain seasons of the year, when kuruma were available only from the farms, the price rose to \$/18.35 a pound... In the United States, by contrast, the retail price for frozen tails was a maximum of \$/5.89 per pound in 1976". Op. Cit., in note 47 (p. 212), at p. 83.

makes them very favourable for farming there are certain difficulties in farming them. Nash, while discussing the feasibility of shrimp farming, refers to these difficulties and notes that:

"...the many stages of larval development require a variety of diets and the larvae are susceptible to disease".¹⁵⁸

Another problem is the high cost of farming natantia.¹⁵⁹ It is, however, to be noted that, as well as the high cost, because of intensive care needed for shrimp and prawn culture, it is not yet feasible to farm these species on a very large scale.¹⁶⁰ The United States is the leading country in exploiting natantia. Other major countries are Mexico, Japan, India, Thailand, Taiwan, the Philippines, Indonesia, and Brazil.¹⁶¹

4. Legal status of natantia: By definition of Article 2(4) of the 1958 Geneva Convention on the Continental Shelf, the various species belonging to the sub-order natantia remain as resources of the high seas. They are active swimmers and cannot in any circumstances be regarded as

158. Nash, Loc. Cit., in note 152 (p. 250), at p. 193.

159. According to Nash "a great deal of success is attributed to the Japanese in the rearing of the Japanese shrimp (*penaeus japonicus*). Although a market is well established, there are certain weaknesses, and the farming of shrimp is possible only by virtue of their very high market value in Japan. Every effort to raise the same shrimp in other parts of the world, using the same techniques, has been economically unsuccessful". Ibid. For the history of shrimps and prawn culture see Iversen, Op. Cit., in note 41 (p. 184), at pp. 179-201; Idyll, Op. Cit., in note 47 (p. 212), at pp. 79-84.

160. Novak, Op. Cit., in note 92 (p. 234), at pp. 227-228.

161. Gulland, Op. Cit., in note 90 (p. 234), at pp. 210-213;

'sedentary'.

There is, however, some evidence regarding their life cycle and habitat that could create complexities in determining their legal position. First, it is important to bear in mind that although natantians are active swimmers they spend their entire life cycle within the neritic zone and are, as discussed earlier, closely associated with the seabed. Secondly, the seasonal migration of these species is very significant since they come under different regimes during various stages in their life cycle. Spawning usually takes place in deeper water and the larvae (nauplius) are brought to coastal waters by the currents. Here they go through various stages to reach the post larval and juvenile stages. The young shrimps remain in these estuaries and nursery grounds for some 3 to 6 months during which period they spend the day on the bottom or burrow themselves and come up near the surface during the night. Before reaching complete maturity they move towards the deeper water.

The result of this complex cycle is that coastal States have sovereignty over natantia for a period of 3 to 6 months and then as the animals move towards the deeper waters they become resources of the high seas. The legal problem presented by this migration raises two fundamental questions:

a. To what extent can a coastal State exercise its sovereignty over these species while they are within its

see also FAO's Yearbook of Fishery and Statistics, Vol. 44, 1977, at pp. 129-132.

territorial waters? The answer is provided in Articles 1 and 2 of the 1958 Geneva Convention on the Territorial Sea and the Contiguous Zone according to which coastal States have absolute sovereignty over their territorial waters with the exception of innocent passage.¹⁶² Their absolute sovereignty, in the absence of any preferential rights to species like shrimp beyond the territorial sea can prove to be very important. They can either be exploited without having reached their maturity or they can be collected and raised by artificial means until they are mature. The 3 inch long shrimps, although immature, are the ones most in demand in some countries like Japan.¹⁶³

b. To what extent are natantian species protected in the neritic zone during spawning? As described earlier, natantians spend their entire life on the continental shelf and therefore spawning can take place either within the neritic zone of a State to whose nursery grounds they return or within the neritic zone of another State.

If spawning takes place within the neritic zone of a State to whose nursery grounds the nauplius is brought by the currents it seems that the provisions of Article 6 of the 1958 Geneva Convention on Fishing and Conservation of the Living Resources of the High Seas are applicable. According to the first paragraph of the above Article:

"A coastal State has a special interest in the maintenance of the productivity of the living resources in any area of the high seas adjacent to its territorial sea".

162. Articles 1, 2 and 14 of the Convention on the Territorial Sea and the Contiguous Zone.

163. Idyll, Op. Cit., in note 47 (p. 212), at p. 82; see

The provisions of the above article do not provide any preferential rights as regards the exploitation of the living resources. The coastal States' special interest is limited to the maintenance of productivity. Furthermore, since this special interest is subject to the area being adjacent to the territorial waters of a coastal State it seems necessary to clarify what constitutes an 'adjacent area'.

If spawning takes place within the neritic zone of another State the provisions of Article 4 of the above Convention are applicable:

"If the nationals of two or more States are engaged in fishing the same stock or stocks of fish or other living marine resources in any area or areas of the high seas, these States shall, at the request of any of them, enter into negotiations with a view to prescribing by agreement for their nationals the necessary measures for the conservation of the living resources affected".

In order to maintain, and even increase, the productivity of the migratory species there must be two sets of regulations: first, regulations regarding their exploitation during spawning by States in whose neritic zone spawning takes place. Secondly, since these species, at the harvestable stage, are resources of the high seas some measures should be taken by coastal States regarding the environment and ecological factors in their nursery grounds. It seems highly unlikely that in the above cases States will introduce and enforce such regulations unless they are granted some preferential rights in the exploitation

also Iversen, *Op. Cit.*, in note 41 (p. 211), at p. 189.

of such species. In the absence of such preferential rights the concept of the 'maritime zone', introduced by Peru, Chile and Ecuador, developed to a new concept as the Exclusive Economic Zone (EEZ) or Fishery Zone (FZ) viz a zone of 200 nautical miles within which coastal States exercise exclusive rights regarding inter alia the exploitation of the living resources. The concept of the 200 mile EEZ or FZ and the progress of the UNCLOS III towards answering some of the problems mentioned above will be discussed in the final two chapters.

ii. Reptantia

The word reptantia means 'crawling' and most species belonging to this sub-order have been adapted for crawling.¹⁶⁴

Barnes states that:

"The Reptantia which contains most of the decapods, consist of benthic animals that have become more highly adapted for crawling than have most shrimp".¹⁶⁵

The sub-order is divided into three sections as follows: a. macrura, b. anomura, c. brachyura.

1. Locomotion: a. Macrura-Reptantia. This includes various species of lobsters and crayfish such as American lobster (*Homarus Americanus*), spiny lobster or crayfish (*Palinurus vulgaris* and *jasus*), the Spanish shovel nose lobster (*Scyllarus*), common lobster (*Homarus gammarus*) and Norway lobster (*Nephrops norvegicus*) also known as Dublin Bay Prawn or Scampi.¹⁶⁶

Although the pleopodes (appendages usually functioning for swimming in malacostraca) are generally reduced in macrura they still manage some swimming.¹⁶⁷ According to Russell-Hunter:

"The Macrura-Reptantia are the crayfish and lobsters where the abdomen is large and

164. Yonge, Op. Cit., in note 45 (p. 211), at p. 45; see also Barnes, Op. Cit., in note 78 (p. 231), at pp. 582-584.

165. Barnes, Op. Cit., in note 78 (p. 231). at p. 582.

166. Campbell, Op. Cit., in note 23 (p. 204), at p. 214; see also Joan M. Clayton, The Living Seashore, 1974, at p. 140; W. Luther and K. Fiedler, A Field Guide to the Mediterranean Sea Shore, translated and edited by P.J. Miller, 1976, at pp. 158-159; David Nichols, John Cooke and Derek Whiteley, The Oxford Book of Invertebrates, 1971, at p. 122.

usually extended but can be flexed under the cephalothorax, the walking limbs are well-developed and the pleopods are reduced and not suitable for swimming".¹⁶⁸

Swimming is exhibited by macruran species when they are in danger, otherwise swimming is not displayed as a natural form of locomotion; thus they cannot be regarded as swimming species nor can they be defined as sedentary species since their capacity for swimming prevents them from being grouped as sedentary animals.

b. Anomura-Reptantia. This includes squat lobster, hermit crab, mole crab and king crab.¹⁶⁹ These animals do not swim and crawling is their only mean of locomotion.¹⁷⁰

c. Brachyura-Reptantia. This includes sponge crab, various spider crabs, masked crab, chinese mitten crab, pea crab, hairy crab, edible crab, common shore crab, swimming crab and velvet swimming crab.¹⁷¹ Most species belonging to this group are adapted for crawling and the only exception in this group is the species belonging to the family called Portunidae. This family includes blue crabs which are active swimmers. Barnes, while describing the section Brachyura, states inter alia that:

-
167. Barnes, Op. Cit., in note 78 (p. 231), at p. 553.
168. Russell-Hunter, Op. Cit., in note 134 (p. 246), at p. 96; see also Barnes, Op. Cit., in note 78 (p. 231), at p. 584.
169. Ibid., at pp. 586-587; see also Yonge, Op. Cit., in note 45 (p. 211), at p. 112; Campbell, Op. Cit., in innote 23 (p. 204), at pp. 216-221.
170. According to Barnes Anomura-Reptantia are essentially crawling species and do not swim at all. Op. Cit., in note 78 (p. 231), at p. 586.
171. Campbell, Op. Cit., in note 23 (p. 204), at pp. 222-229.

"Most crabs cannot swim, but members of the family Portunidae, which includes the common edible crab *Callinectes sapidus* of the Atlantic coast, are the most powerful and agile swimmer of all crustaceans".¹⁷²

2. Nutrition and habitat: Species belonging to the sub-order Reptantia are generally predacious or scavengers.¹⁷³ Most crabs are scavenger-detritus feeders although some are also filter feeders such as squat lobsters and hermit crabs.¹⁷⁴

Lobsters usually live offshore. Spiny lobster or rock lobster (*palinurus*) is a deep water creature.¹⁷⁵ Norway lobster or marine crayfish is also a deep water animal which, according to Yonge, "never appears on the shore".¹⁷⁶ Common lobster (*homarus*) usually lives in the sublittoral zone. They move into the shallow water during the summer and return to deeper water during the autumn.¹⁷⁷ This movement is also exhibited on a very large scale by spiny lobster.¹⁷⁸ Again it must be emphasized that the majority of Reptantia are inhabitants of the continental shelf.¹⁷⁹

Crabs are found in various depths. Hermit crabs are inhabitants of deep water while young hermit crabs appear

172. Barnes, Op. Cit., in note 78 (p. 231), at p. 586.

173. Ibid., at p. 590.

174. Ibid. See also Clayton, Op. Cit., in note 166 (p. 257), at p. 137.

175. Ibid., at p. 140; see also Nichols et al, Op. Cit., in note 166 (p. 257), at p. 122.

176. Yonge, Op. Cit., in note 45 (p. 211), at p. 45.

177. Nichols et al, Op. Cit., in note 166 (p. 257), at p. 122.

178. William Herrnkind & Paul Kancituk, "Mass Migration

in large numbers in shallow pools.¹⁸⁰ Common shore crabs (*carcinus maenas*) are inhabitants of sandy and rocky shores and of shallow waters.¹⁸¹ Edible crab (*cancer pagurus*) appear on lower shores down to 100 metres but again like hermit crabs the larger specimens inhabit even greater depths.¹⁸²

Two species of porcelain (broad-clawed porcelain crab and long-clawed porcelain crab) inhabit the middle and lower regions of rocky shores.¹⁸³ The swimming crab and velvet swimming crab are inhabitants of shallow water between 5 to 20 metres deep.¹⁸⁴ King crab (*paralithades camtschatica*) of the North Pacific is a deep water species which appears in depths of 250 metres.¹⁸⁵ Finally, there is the Tanner crab which has a very similar ecology to that of king crab.¹⁸⁶

3. Economic importance of reptantia: Unlike natantia which are very fast growing species, reptantians do not

of Spiny Lobster *Panulirus Argus*", in Animal Migration, Navigation, & Homing, edited by K. Schmidt-Koenig & W.T. Keeton, 1977, at pp. 430-438.

179. Campbell, Op. Cit., in note 23 (p. 204), at p. 214.

180. Clayton, Op. Cit., in note 166 (p. 257), at p. 141.

181. Campbell, Op. Cit., in note 23 (p. 204), at p. 226.

182. Ibid.

183. Ibid., at p. 218; Clayton, Op. Cit., in note 166 (p. 257), at p. 142.

184. Ibid; Campbell, Op. Cit., in note 23 (p.204), at p. 228.

185. Gulland, Op. Cit., in note 90 (p. 234), at p. 208.

186. Ibid.

reach a marketable size until an average age of 4 to 6 years, depending on the species and the regions.¹⁸⁷ Although lobsters cannot match shrimp, or even crab, from the quantity point of view, this has been counter balanced by the cash value returned for them. Novak states that:

"The lobster is undoubtedly the most valued and sought-after crustacean and this scarcity value is reflected in both past and present prices".¹⁸⁸

Mann, also referring to this fact remarked that:

"...in eastern Canada in 1961 the landed value of lobsters and scallops combined \$21 million, greater than the combined value of the two most important fish species, cod (\$15.4 million) and haddock (\$4.6 million)".¹⁸⁹

In 1958 the world's total landing of lobster, rock lobster, spiny lobster, etc amounted to 79,000 metric tonnes (live weight) while the squat lobster was estimated at 32,000 metric tonnes. In 1968 the figures rose to 96,000 and 50,000 metric tonnes respectively.¹⁹⁰ In 1977, according to the FAO's estimations, the total landings of the above species were 95,755 and 87,277 metric tonnes respectively.¹⁹¹ Namibia, South Africa, Cuba, Brazil, Australia, New Zealand, and Canada are the leading countries in exploiting lobsters.¹⁹²

Crabs, on the other hand, have never been as highly priced as lobsters although this difference has been

187. Ibid.

188. Novak, Op. Cit., in note 92 (p. 234), at pp. 33-34.

189. Mann, Loc. Cit., in note 24 (p. 204), at p. 242.

190. Gulland, Op. Cit., in note 90 (p. 234), at pp. 240-241.

191. FAO's Yearbook of Fishery Statistics, Vol. 44, 1977,

compensated for by the larger quantity of these species being exploited throughout the world. According to FAO's estimation, the world's total landing of various species of crabs in 1958 amounted to 197,000 metric tonnes (live weight) and rose to 397,000 metric tonnes in 1969.¹⁹³ In 1977 the world's total landings of these species was 448,756 metric tonnes.¹⁹⁴ Japan, the United States and the Soviet Union are the major exploiters.¹⁹⁵

In the Northeast Atlantic, shore crab (*carcinus maenas*) is very abundant (especially in coastal waters of the central and southern part) and has remained under-exploited by countries in that region except for Spain and Portugal. It is important to mention that this species is the major predator of the many commercially important molluscs and, therefore, if exploited more intensively by other nations it would improve both the crab and molluscs industries in that region.¹⁹⁶

4. Legal status of Reptantia: Locomotion based on swimming ability has been adopted as the main criterion determining the legal status of crustacea. The sub-order Reptantia is divided, as described above, into three sections; thus their legal status, according to Article 2(4)

at pp. 126-128.

192. Ibid.

193. Gulland, Op. Cit., in note 90 (p. 234), at p. 240-241.

194. FAO's Yearbook of Fishery Statistics, Vol. 44, 1977, at pp. 123-125.

195. Ibid; Gulland, Op. Cit., in note 90 (p. 234), at pp. 240-41.

196. Ibid., at p. 212.

of the 1958 Geneva Convention on the Continental Shelf is as follows:

(a). Macrura-Reptantia. This includes lobsters and crayfish which are not essentially swimming organisms although this ability is displayed when they are in danger. These are neither sedentary nor swimming species.

(b). Anomura-Reptantia. This includes squat lobster, hermit crab, mole crab, shore crab, stone crab and king crab. These are essentially sedentary species and cannot swim.

(c). Brachyura-Reptantia (true crabs). This includes sponge crab, common shore crab, masked crab, edible crab and various species of spider crabs. These are also crawling animals with the exception of the family Portunidae. To this family (Portunidae) belong the blue crabs which are active swimmers and cannot be considered as sedentary.

The following species of Reptantia have been listed as continental shelf fisheries of the United States:

- | | |
|-----------------------------|--------------------------------------|
| " 1. Tanner crab | (<u>chionocetes tanneri</u>) |
| 2. " " | (" <u>opilio</u>) |
| 3. " " | (" <u>angulatus</u>) |
| 4. " " | (" <u>bairdi</u>) |
| 5. King crab | (<u>paraethodes cantschutica</u>) |
| 6. " " | (" <u>platypus</u>) |
| 7. " " | (" <u>brevipes</u>) |
| 8. Lobster | (<u>Homarus Americanus</u>) |
| 9. Dungeness crab | (<u>Cancer magister</u>) |
| 10. California King crab | (<u>paraethodes Californiesis</u>) |
| 11. " " " | (" <u>rathburi</u>) |
| 12. Golden King crab | (<u>lithodes acquispinus</u>) |
| 13. Northern stone crab | (<u>lithodes maja</u>) |
| 14. Stone crab | (<u>menippe mercenaria</u>) |
| 15. Deep sea red crab | (<u>geryon quinquedens</u>)".197 |

197. See the list in 15 ILM (1976) at p. 637.

It is to be noted that in the above list lobster (*homarus americanus*) which belongs to the division anomura is regarded as a natural resource of the continental shelf although it is not a sedentary species.

The list of living organisms which are considered as the natural resources of the continental shelf of the USSR, however, includes only the following Reptantia:

"A. True crabs (brachyura)

1. Tanner crab (*chionoecetes opilio*) and other species of this group
2. Hairy (Korean) crab (*erimacrus isenbeckii*, *telemessus*, *cheirgorus*)
3. Other species of crab of the continental shelf of the USSR, except for species which are capable of swimming when mature.

B. Anomuran (*lithodidae*)

4. Alaska King crab (*paraethodes camschaticus*)
5. Blue crab (" *platypus*)
6. Koliuchii crab (" *brevipes*)
7. Ravnoshipyi (*lithodes aquispinus*)
8. Arctic crab (" *maja*) ".198

198. Soviet Statutes and Decisions, Spring, 1970, at p. 282. Other countries have not, so far, published a list of the species which they regard as sedentary.

Conclusion

The coastal or neritic zone, i.e. the water covering the continental shelf, is the most productive area for plankton, nekton and benthic organisms. The high productivity is based mainly on the existence of the shelf on the one hand and its proximity to the land on the other.

The interrelationship between various organisms inhabiting the continental shelf is so important that any destruction of one part of community can upset the whole balance of the ecosystem in that area. Thus the exploitation of marine organisms within the neritic zone, whether by the coastal State or by nationals of other States, should take account of the importance of this interrelationship. This can only be achieved by identification of the resources which are under exploitation and by examining their relationship with other species and their environment.

The 1958 Geneva Convention on the Continental Shelf did not provide any guidelines regarding the importance of maintaining or improving the biological productivity of coastal zone. It divided living organisms into two groups and put each under different legal regimes. Sedentary species were regarded as resources of the shelf while other organisms were regarded as resources of the high seas.

The legal status of crustacea and molluscs requires further analysis on the following grounds:

First, the shellfish industry which is based on the exploitation, processing and marketing of molluscs and crustacea has developed in many countries in the past two

decades and in some countries such as Japan, the United States, Canada and Mexico it has become a major enterprise. The future of the shellfish industry depends entirely on the legal status of these species. To protect and develop their shellfish industries coastal States are entitled to know the extent of their rights over species which have never been defined.

Secondly, not only has the vagueness of Article 2(4) of the Convention on the Continental Shelf remained unresolved but the article has appeared in an even more obscure and incomprehensible form in the Texts which have been produced so far by the UNCLOS III.

The definition of natural resources of the continental shelf was, as discussed in the previous Chapter, originally adopted by the Fourth Committee during the UNCLOS I in 1958. According to that definition the sovereign rights of the coastal States over the submarine areas of the continental shelf extended to sedentary species as well as to mineral and non-living resources. It has been pointed out that the original draft, defining the natural resources, submitted by the six powers had specifically excluded crustaceans and swimming species from the definition. Although at the 5th Plenary Session of the Conference the proviso excluding crustacea and swimming species was deleted, the doubts over the legal status of crustacea remained and Article 2(4) became the subject of various interpretations.

In 1963 the dispute between France and Brazil over lobster gave rise to a close examination of the definition of the sedentary species for the first time; this proved to be an important step as far as the legal problem of crustacea was concerned.¹⁹⁹

Some countries such as France and Japan maintained that crustaceans were the living resources of the high seas while others like Brazil insisted that crustaceans were included in the definition of Article 2(4). In 1960, the State Department stated that:

"The definition of 'natural resources' in the Continental Shelf Convention includes such species as shellfish which burrow into the sea bottom or are constantly in contact with the sea bottom during the part of their life history when they are of value commercially. Hence, clams, oysters, abalone, etc. are included in the definition, whereas shrimp, lobsters, and finny fish are not".²⁰⁰

The position of the United Kingdom was stated in the House of Commons by an official from the Ministry of Agriculture and Fishery as follows:

"...lobsters swim and crabs do not. Therefore, crabs are within the Convention and lobsters are not".²⁰¹

In 1964, the United States Government declared that it considered the Alaska King crabs as natural resources

199. For the dispute between France and Brazil and other disputes regarding the interpretation of Article 2(4) see below Chapter VIII (B).

200. M. Whiteman, Digest of International Law, Vol. 4, 1965, at p. 863.

201. BPIL 1964, at pp. 58-59. Note that the United States since 1976 has included lobster in its list of the continental shelf fisheries; see above at p. 263.

of the continental shelf, a claim to which Japan strongly protested.²⁰²

In subsequent years while the unilateral interpretations or declarations by various States have asserted a wider scope regarding the coastal States' rights over sedentary species, the definition itself has remained unchanged. During the UNCLOS III the same definition has appeared in Article 63(4) of the 1975 Informal Single Negotiating Text²⁰³, Article 65(4) of the Revised Single Negotiating Text²⁰⁴, Article 77(4) of the Informal Composite Negotiating Text²⁰⁵ and finally in Article 77(4) of the ICNT REV. III.²⁰⁶

The legal purpose of Article 2(4) of the 1958 Geneva Convention on the Continental Shelf was to satisfy States which were advocating the freedom of fishing beyond the territorial sea. To achieve that goal a restricted definition of living resources of the continental shelf seemed inevitable. Article 2(4) was, in fact, a safeguard to clarify the rights of coastal States over the seabed and subsoil of the continental shelf on the one hand and to secure the freedom of fishing on the other.

That need no longer exists and it seems absurd to uphold a definition which from the beginning was vague and

202. See below Chapter VIII (B).

203. The Informal Single Negotiating Text (ISNT), A/CONE/62/WP 8, 7 May, 1975.

204. The Revised Single Negotiating Text (RSNT), A/CONE/62/WP 8/Rev.1, 6 May, 1976.

205. The Informal Composite Negotiating Text (ICNT), A/CONF/62/WP 10 and ADD.1, 1977.

206. The Informal Composite Negotiating Text Rev. 3,

has created so many arguments. Furthermore, its legal significance is no longer valid since the whole concept regarding the freedom of fishing has changed. Article 56(1) of the Draft Convention on the Law of the Sea (ICNT) entitled "Exclusive Economic Zone" is evidence of that change. It states that:

"In the exclusive economic zone, the coastal State has:

(a) sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the subsoil and seabed and the superjacent waters, and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds".²⁰⁷

Article 57 states that exclusive economic zone shall not extend beyond 200 nautical miles from the baselines from which the breadth of the territorial sea is measured.

The above two articles provide a solution to the problem of the protection of living resources as well as the maintenance of the biological productivity within the 200 nautical miles by coastal States which otherwise would be subject to the different regimes.

Articles 61 and 62 deal with conservation ^{and} utilization of the living resources. Article 62 provides a significant restriction on the rights of coastal States regarding the utilization of the living resources within the EEZ. Article 62(2) states:

207. Article 56 of the Draft Convention on the Law of the Sea (ICNT). All references in this part are made to A/CONF/62/WP 10 and ADD. 1.

"The coastal State shall determine its capacity to harvest the living resources of the exclusive economic zone. Where the coastal State does not have the capacity to harvest the entire allowable catch, it shall, through agreements or other arrangements and pursuant to the terms, conditions and regulations referred to in paragraph 4, give other States access to the surplus of the allowable catch. (4) Nationals of other States fishing in the exclusive economic zone shall comply with the conservation measures and with the other terms and conditions established in the regulations of the coastal State".²⁰⁸

It is, however, surprising to see that Article 68 entitled "Sedentary Species" states that:

"This part does not apply to sedentary species as defined in paragraph 4 of Article 77".²⁰⁹

Article 77 is, as mentioned above, the same as that adopted in the Geneva Convention on the Continental Shelf in 1958. The exclusion of sedentary species from the EEZ can be regarded as a mistake which will lead to unnecessary complexity rather than clarity in the future for the following reasons:

First, there is no general agreement among States on what species are sedentary. For example, the lobster '*homarus americanus*', as we saw, is listed as one of the continental shelf fisheries by the United States. It has already been proved that they are capable of swimming and, therefore, they cannot be regarded as a sedentary species.

Secondly, the continental shelf, according to Article 76 of the Draft Convention on the Law of the Sea (ICNT) is

208. A/CONF/62/WP 10 and ADD.1.

209. Ibid.

defined as the natural prolongation of land territory. This can be very important to coastal States with a narrow shelf or States whose seabed is not the natural prolongation of the land territory. The number of States in the above two groups is considerable. These States would prefer to include their sedentary species within their EEZ. It also seems unrealistic to have rights over all living resources within the 200 miles EEZ and not over sedentary species.

Thirdly, the difference between the rights of the coastal State in its EEZ and those over sedentary species is that in the former the coastal State shall, after estimating its capacity to harvest the entire allowable catch, make the surplus available to other States, which seems a logical arrangement. In the latter there is no obligation on the part of the coastal State and seems illogical not to make the surplus available to other States.

Paragraph 4 of Article 77 does not serve any useful purpose and it is best to include sedentary species with other living resources under the same regime and to delete Paragraph 4. This would serve three important purposes:

First, there would be uniformity regarding living resources.

Secondly, confusion concerning what is and what is not a sedentary species would be avoided.

Thirdly, the surplus of sedentary species, like any other living resources, would be available to other States since, unlike mineral resources, these are renewable resources.

CHAPTER VI

NON-LIVING RESOURCES OF THE CONTINENTAL SHELF

Introduction

The right of coastal States to exploit the non-living resources of the subsoil beyond the territorial waters was an established rule recognised by customary international law.¹ In 1858 Great Britain declared in the Cornwall Submarine Mine Act that:

"All Mines and Minerals lying below Low-water Mark under the open Sea, adjacent to but not being Part of the County of Cornwall, are, as between the Queen's Majesty in right of Her Crown on the one hand, and His Royal Highness Albert Edward Prince of Wales and Duke of Cornwall in right of His Duchy of Cornwall on the other hand, vested in Her Majesty the Queen in right of Her Crown as Part of the Soil and territorial Possessions of the Crown".²

Section 8 of the above Act stated that:

"...the expression 'Mines and Minerals' shall comprehend all Mines and Minerals and all Quarries, Veins, or Beds of Stone, and all Substrata of any other nature whatsoever, and the Ground and Soil in, upon, and under which such Mines and Minerals, Quarries, Veins or Beds of Stone, and other Substrata lie".³

In addition to Great Britain, Australia, Chile, Japan

-
1. For the legal status of the seabed and subsoil in the United Kingdom see John Gibson, "The Ownership of Sea Bed Under British Territorial Waters", Vol. VI, No. 2, International Relations, November 1978, pp. 474-499; Geoffrey Marston, The Marginal Seabed: United Kingdom Legal Practice, 1981.
 2. 21 & 22 Vict. Chapter 109, Section 2.
 3. Ibid, Section 8. For the background to the Act see Marston, Op. Cit., in note 1 (p. 271), at pp. 75-113.

and Canada were engaged in coal mining off their coasts.⁴

In 1934 the Petroleum Production Act was issued in Britain asserting the exclusive rights of the Crown to search for and exploit petroleum in its natural condition in strata. A year later, the Board of Trade was empowered to issue licences covering the submarine areas of the coasts of Great Britain.⁵

The only non-living resources of the subsoil exploited beyond the territorial waters was coal, the mining of which was carried out from the shore by tunnelling.⁶ Such operations were limited since mining techniques did not permit the exploitation of coal far beyond the territorial waters. More important, they did not interfere with any of the established international customs such as fishing, navigation and the laying of submarine cables.

In 1945 the United States proclaimed its control and jurisdiction over the natural resources of its continental shelf.⁷ Although it referred to oil and other mineral resources it was obvious that the predominant factor in the US Proclamation was the exploitation of oil and gas.⁸

4. Sluka, *Op. Cit.*, in note 106 (p. 60), at p. 42.

5. 24 & 25 Geo 5, Chapter 36; Petroleum Production Rules, 1935 (S.R. and O., 1936, No. 426); see Colombos, *Op. Cit.*, in note 102 (p. 59), at p. 69.

6. See above Chapter II (B) at pp. 58-60.

7. See above Chapter II (B) at pp. 72-85.

8. According to Kunz "The doctrine of the continental shelf is the outcome of the fact that petroleum is highly needed, that geologists have located great sources of petroleum below the waters of the continental shelf and that engineering progress has made

The 1958 Geneva Convention on the Continental Shelf granted coastal States 'sovereign rights' over the natural resources of the continental shelf and Article 2(4) of the same Convention defined the natural resources as "mineral and non-living resources of the seabed and subsoil...".⁹ It will be contended that the above instruments, as well as the documents which have been produced by the UNCLOS III since 1975 have failed to provide a comprehensive description of the resources included or even sufficient information to name and define the mineral resources involved.

In this Chapter the question of non-living resources of the continental shelf, their definitions and their exploitation will be discussed. Furthermore, the exploitation of non-living resources which affects the ecology of the coastal zone will be examined. In order to do so, the non-living resources of the continental shelf have been divided into three groups:

- A. Seawater as a resource
- B. Non-living resources of the seabed
- C. Non-living resources of the subsoil

Each of the above headings will be discussed in a separate section of this Chapter.

possible the extraction of this oil". Loc. Cit., in note 36 (p. 78), at p. 829.

9. Articles 2 and 3 of the 1958 Geneva Convention on the Continental Shelf.

A- Seawater as a Resource

Introduction

The sea contains more than 97 per cent (about 320 million cubic miles) of all the waters on earth (Table 6).¹⁰ Seawater is generally referred to as being saline and salinity has been described as "total amount of dissolved salts" or "the amount of inorganic matter dissolved in sea water".¹¹ The amount of inorganic matter in sea water is 35,000 parts per million (ppm) or 3.5 per cent.¹² The presence of dissolved salts in sea water has prevented man from using it for direct human consumption as well as for irrigation and industry.

For direct human consumption, water should not contain more than 500 parts per million of dissolved salts.¹³ For irrigation and industry the amount varies from 50 to 2000 parts per million.¹⁴ The world's fresh water resources amount to less than 1 per cent of the world's total water.¹⁵ It seems inevitable that with ever increasing use of fresh

-
10. Luna B. Leopold, Water - A Primer, 1974, at p. 119; Resources and Man, A Study and Recommendation by the Committee on Resources and Man, 1969, at p. 137.
 11. Perkins, Op. Cit., in note 13 (p. 9), at p. 4; see also R.L. Smith, "Water of the Sea: The Ocean's Characteristics and Circulation", in The Ecology of the Seas, Op. Cit., in note 15 (p. 201), pp. 23-58, at p. 26.
 12. Leopold, Op. Cit., in note 10 (p. 274), at p. 107.
 13. Ibid.
 14. Keith Smith, Water in Britain, 1972, at pp. 205-206.
 15. Leopold, Op. Cit., in note 10 (p. 274), at p. 120, (Table 8).

TABLE 6 ¹⁶

Water on the Earth

LOCATION	WATER VOLUME (CUBIC MILES)	PERCENTAGE OF TOTAL WATER
SURFACE WATER		
Fresh-water lakes	30,000	.009
Saline lakes and inland seas	25,000	.008
Average in stream channels	300	.0001
SUBSURFACE WATER		
Water in unsaturated aerated zone (includes soil moisture)	16,000	.005
Ground water within depth of 1 / 2 mile	1,000,000	.31
Ground water, deep lying	1,000,000	.31
OTHER WATER LOCATIONS		
Icecaps and glaciers	7,000,000	2.15
Atmosphere (at sea level)	3,100	.001
World ocean	317,000,000	97.2
Totals (rounded)	326,000,000	100

16. Leopold, Op. Cit., in note 10 (p. 274), at p. 120, (Table 8).

water demand will exceed supply and man will have to concentrate on finding ways to make use of sea water. The problem of the fresh water shortage is serious at the moment and will become critical by the year 2000 AD.¹⁷

Pereira, describing the increasing demand for fresh water states that:

"An important change is developing in the pattern of demand, as industry calls for an ever increasing proportion now amounting to one half of the total supply. In 1966 a survey by the Economic Commission for Europe, of twenty nine countries, estimated total water use at 330 m³ per annum or 900 litres per day per head of population. Of this only 14% was municipal and domestic, 38%¹⁸ was agricultural and 48% was industrial".

He further notes that:

"The problems are reaching critical levels of decision at national government scale in many industrial countries including Britain, France, Germany, USA, USSR and Japan".¹⁹

-
17. On 15 December, 1976, the UN General Assembly adopted Resolution 3513 (XXX) entitled "United Nations Water Conference". Pursuant to this Resolution the Water Conference was held in Mar del Plata, Argentina from 14-25 March, 1977. There were representatives from 116 States, 17 Intergovernmental Organizations and 58 non governmental Organizations. Various problems regarding the shortage of fresh water for drinking, sanitation and agricultural uses were discussed and a number of recommendations were put forward. See "United Nations Water Conference Adopts a Plan of Action in Argentina", Vol. XIV, No. 4, UN Chronicle, April, 1977, at pp. 35-39.
 18. H.C. Pereira, Land Use and Water Resources, 1973, at p. 10. He notes that "The 1970 estimates for the USA are 7%, 36% and 57%", *ibid*.
 19. *Ibid*. See also R.H. Charlier, "Other Ocean Resources", in Ocean Yearbook 1, edited by Elisabeth Mann Borgese and Norton Ginsburg, 1978, pp. 160-210, at pp. 160-162.

As well as making the maximum use of the present sources of fresh water there are two ways of solving the problem of the water shortage; the first is desalination and the second is using the icecaps and glaciers which contain some 7,000,000 cubic miles of fresh water.²⁰

As well as fresh water, the prospect of extracting minerals from seawater is already in practice and so far magnesium, bromine and common salt have been extracted successfully and in large quantities.²¹ Uranium and other important metals have not yet been proved economically and technically possible although their extraction has not been ruled out in the near future.²²

It is, however, obvious that sea water directly and indirectly is used as a resource and, therefore, the question arises as to what extent these and other uses of sea water, such as its use for cooling power plants, can be carried out without affecting the ecology and biological productivity of the coastal zone. In this section the various uses of the sea water covering the continental shelf and the legal and biological effects of these uses will be discussed.

20. Leopold, *Op. Cit.*, in note 10 (p. 274), at p. 120. According to Leopold "...an appreciable part of the world's 2 per cent is frozen in ice caps and glaciers. The Antarctic icecap covers 6 million square miles and contains 95 per cent of the frozen water. If this icecap were melted at a uniform rate, the 6 million cubic miles would feed the Mississippi for 50,000 years". *Ibid*, at p. 120.

21. Kenneth Warren, Mineral Resources, 1973, at pp. 23-24.

22. Norman J. Keen, "Recovery of Uranium from Sea Water", in *Chemistry and Industry*, 16 July, 1977, pp. 579-582.

i. Desalination

The removal of dissolved inorganic matter from sea water so that the average salinity of 35,000 ppm is reduced to less than 2,000 ppm is described as desalination.²³ There are nine major ions in sea water comprising over 99 per cent of the total dissolved constituents (Table 7).

TABLE 7
Major Constituents of Seawater ²⁴

Constituent	g/kg of water at salinity 35 ppt
Chloride	19.353
Sodium	10.76
Sulfate	2.712
Magnesium	1.294
Calcium	0.413
Potassium	0.387
Bicarbonate	0.142
Bromide	0.067
Strontium	0.008

Although desalination is regarded as the ultimate way to meet the fresh water shortage in the future there are still two major problems surrounding the present operating plants which have not yet been solved.²⁵ These

23. Skinner and Turekian, Op. Cit., in note 2 (p. 3), at pp. 109-110.

24. Table 7 has been arranged by Oceanic Foundation Staff with S.V. Smith in an article entitled "Chemical Oceanography", in Open Sea Mariculture, Op. Cit., in note 12 (p. 8) pp. 106-120, at p. 107(Table 5.1).

25. Smith, Op. Cit., in note 14 (p. 274), at pp. 205-206;

are: (a) economic and (b) environmental.

(a) Economic Problems

In 1972 a report by the Director of the US Office of Saline Water referred to 700 desalting plants throughout the world.²⁶ These plants produced some 70,000 cubic miles of fresh water per day (m^3d), an average of $100 m^3/d$.²⁷

Desalination is carried out by several methods of which following are important:

1. Multistage flash distillation
2. Long tube vertical evaporation
3. Electrodialysis
4. Reverse osmosis
5. Freezing
6. Crystallization.²⁸

Although technology has overcome all the problems of converting sea water into fresh water it has not yet overcome the economic problems. The problems are mainly the cost of desalination plant, the maintenance of the plant and finally the cost of distribution to the consumers.²⁹

see also James A. Crutchfield, "Resources from the Sea", in Ocean Resources and Public Policy, Op. Cit., in note 6 (p. 5), at pp. 107-108.

26. Pereira, Op. Cit., in note 18 (p. 276), at pp. 15-16.

27. Ibid.

28. Skinner and Turekian, Op. Cit., in note 2 (p. 3), at pp. 110-117; Tony Loftas, The Last Resource, Man's Exploitation of the Oceans, Revised ed, 1972, at pp. 83-95.

29. Pereira has outlined the above problems by stating that:

"The difficulties are, basically, economic; water for community use is required in very large quantities at a very low cost. The energy required to remove the salt is 0.75 Kw/hour for each cubic metre of sea water (app 3 KwH per 1,000 gallons). The concentrated

Discussing the high cost of desalination, Skinner et al suggest that:

"The only way out of this dilemma appears to be in the development of large (population 100,000 or more) communities which can use the power of nuclear reactors for desalination for agricultural purposes and for the industrial processing of raw materials. Such nuclear complex (or nuplex) might then be economically viable".³⁰

It must be emphasized that fresh water has become or will become a commodity for many industrial and agricultural countries as well as for arid areas; that is a raw material which has to be paid for.³¹ The demand for fresh water for domestic, agricultural and industrial uses will continue

brine solution which remains is highly corrosive so that desalination plant is expensive both to build and to maintain. The techniques are already developed on a practical scale for situations in which these costs can be met, eg. in oil well operations in coastal deserts such as in Kuwait or where urban development has completely outrun water resources, as in Guernsey; distillation plant has been in use there for more than a decade for domestic supplies". Op. Cit., in note 18 (p. 276), at p. 15.

30. Skinner and Turekian, Op. Cit., in note 2 (p. 3) at p. 118. Referring to the possibility of using nuclear energy for obtaining fresh water from sea water Periera states that: "At recent conferences on desalination held in Madrid by the IAEA, the conclusion reached was that atomic power at costs low enough for large scale water supply would not be obtained for at least a decade". Op. Cit., in note 18 (p. 276), at p. 18.
31. According to Pereira:
"In seeking some prospective for the costs of future public water supplies for more industrially advanced communities, it is necessary to remember that the most readily available water sources and the most geographically favourable storage sites have, in part, responsible for the very low water costs which are a feature of modern industrial communities. It is most important, however, in considering the costs of any new proposals for water supply, that these should be compared not with the supply of water from systems established at

to increase and this increase will be particularly substantial in industrial countries. In the early 1970's the Western European countries were consuming between 100 to 220 litres per person per day. In Southern England the Water Resources Board predicted a consumption of 300 litres per person per day for 1980 and 360 litres for 2000 AD.³² In the United States consumption was some 400 litres per day in the early 1970's and the official forecast predicted an average of 600 litres by 1980 and 1,000 litres by 2000 AD.³³

As mentioned earlier, there are already more than 700 desalination plants in operation throughout the world. The number will, no doubt, continue to increase and this increase will include bigger plants with greater capacities. Desalination plants, whether using conventional forms of energy or using nuclear power, will be continuing to produce fresh water from the sea. The high costs will seem justified when the other sources of fresh water cannot meet the increasing demand and water will be considered as a raw material. In other words, sea water is used and will be used as a resource and, therefore, its exploitation, should, from a legal point of view, be examined.³⁴

lower costs in the past but with supply from new developments by alternative conventional methods in the future". Op. Cit., in note 18 (p. 276), at p. 20.

32. "Water Supplies of South East England", Water Resources Board, 1966, Publication No. 1, HMSO.

33. C.E. Murray and E.B. Reeves, Estimated Use of Water in the US in 1970, 1972, US Geo. Survey Circ. 676 cited by Pereira, Op. Cit., in note 18 (p. 276), at p. 10.

34. See below at pp. 297-308.

(b) Environmental Problems

Desalination plants are usually built near the coast since there has to be easy access to the sea. Accessibility is necessary not only in order to obtain sea water for treatment easily but more important for the discharge of thermal effluents. The discharge of effluents has two effects. First, it increases the salinity of the water at and around the point of discharge. Secondly, it increases the water's temperature in the same area. Johannes states that:

"Effluents from desalination plants are characterised by elevated levels of not only salinity but also temperature, and toxic metals such as copper, zinc and nickel. They may also contain various chemicals added for PH and corrosion control. These effluents are often sufficiently saline that despite their elevated temperature they sink and flow along or near the bottom where there is no loss of heat directly to the atmosphere and where their potential for damage to benthic communities is greatest".³⁵

A small desalination plant set up by the Environmental Research Laboratory, a unit of the Institute of Atmospheric Physics of Arizona on the north west coast of Mexico,

-
35. R.E. Johannes, "Coral Reefs and Pollution", in Marine Pollution and Sea Life, General Editor Mario Ruivo, FAO, 1972, pp. 364-375, at p. 369. Among toxic metals used to reduce the corrosion of the distillation systems copper is the most dangerous contaminant. According to Johannes:
"The mixture of brine blowdown and cooling water discharged from desalination plants may contain this element at concentrations 6-8 times as high as the recommended maximum concentration of 0.02mg/l, and 30-40 times the natural copper concentration in coastal waters". Ibid.

extracted one litre of fresh water from 10 litres of sea water. The brine equivalent to 90% was discharged into the sea.³⁶ In 1973 the plant was distilling 10,000 litres of fresh water a day and discharging 90,000 litres of polluted sea water into the sea.³⁷

It was shown in the previous Chapter how biological productivity is determined by physical, chemical and biological factors. The discharge of effluents from a desalination plant into the sea interferes with both physical and chemical factors since its immediate effects are a rise in temperature and an increase in salinity. Living organisms have a threshold of both temperature and salinity and, therefore, any substantial decrease or increase below or above the threshold can destroy them. This is most apparent in the case of smaller organisms. It must be emphasised that prior to installing a desalination plant a study of the area and its ecosystem is needed although this important requirement has not been met so far.³⁸

36. Pereira, Op. Cit., in note 18 (p. 276), at pp. 18-19.

37. Ibid.

38. According to Johannes:

"Desalination plants are proliferating as the demand for fresh water grows and the cost of desalination decreases. It is disturbing, therefore, to note how little effort seems to have been made to examine the ecological consequences of brine disposal. Of the first 481 research and development reports based on work carried out under contract to the United States Office of Saline Water, only three specifically concern ecological problems attending effluent disposal in the marine environment. It is also noteworthy that of the eight desalination plants surveyed by Zeitoun, Mandelli and McIlhenny (1969) (five of which are located on coastlines in regions of extensive coral reef

The legal problems caused by such desalination plants could be very important with regard to the protection of the marine environment. Since other uses of sea water, i.e. its use of cooling power plants and the extraction of minerals, have almost the same effluents these problems will be discussed later.

development) no governmental regulations existed with regard to effluent discharge and in only one case (Nassau, Bahamas) was an oceanographic or engineering study of the effect of effluent undertaken before the plant was built". Loc. Cit., in note 35 (p. 282), at p. 369. As to the effects of effluents on marine organisms see W.D. Clarke, J.W. Joy and R.J. Rosenthal, "Study of Key West Desalination Plant Effluent", Final Report to US Dept of Interior, Westinghouse Research Labs (1970) No. 14-12-470, at p. 73. According to Charlier, "Presently desalination plant capacity reaches up to 28,000m³ per day. Since 1968, installed capacity has increased up to 30% each year and it is expected, according to Gould, that by 1978 fresh water production from the sea water will reach 4 million m³ per day valued currently at at least \$ 250 million per year". Loc. Cit., in note 19 (p. 276), at pp. 160-162.

ii. The Use of Sea Water for Cooling

Sea water is used for cooling in power plants whether nuclear or operating by fossil fuel. The amount of sea water used by each power plant is substantial. According to Langford:

"A modern 2000 MW(e), direct-cooled coastal power station requires, at full load, some 50-60 million gallons of cooling water each hour".³⁹

There are two main environmental problems in using the sea water for cooling power plants. These are:

(a) direct biological problems and (b) indirect biological problems.

(a) Direct biological problems

These are very significant since seaweeds, plankton, molluscs, crustacea and various fish are destroyed during intake of the sea water. The water is usually taken from the surface of the sea near the shore and as discussed before this is normally where the highest level of biological productivity occurs. Another important effect of power plant is the creation of currents during both intake and discharge which can adversely affect migratory species.⁴⁰

39. Terry Langford, "Biological Problems with the Use of Sea Water for Cooling", in *Chemistry and Industry*, 16 July, 1977, pp. 612-616, at p. 612.

40. McHugh et al state that:
"The principal problem with power plants is the requirement for large quantities of sea water for cooling. Entrainment in the cooling water system can destroy eggs and larvae of fish and shellfish and also the plankton on which animals of the coastal zone feed. Currents created by intake and discharge of large volumes of water affect the behaviour of marine life".
J.L. McHugh, Gerald A. Bertrand and Robert A. Ragotzkie,

During intake the problem is twofold. First, there is a general destruction of various living organisms. Second, as a result of this destruction, intake-screen blockage is inevitable. Almost all power plants have to be shut down once or twice a year for the cleaning of culverts.⁴¹ Langford notes that:

"The most commonly encountered biological problem with cooling-water systems has probably been the fouling of culverts by the common mussel *mytilus edulis* or its counterparts in other parts of the world. The free living larvae of the mussel enter the system entrained in the cooling water and given a chance, eg. a rough surface, cracks, interstices or areas of slow-moving water, the mussel larvae (veliger) will settle and grow into an adult mussel. In suitable conditions, even where velocities are fairly high, mussels can accumulate such that the culvert diameter is drastically reduced".⁴²

To prevent mussel fouling in culverts various methods have been used amongst which chlorination of water has proved to be the most effective and is now being widely

"Strategies and Research Needs for Coastal Zone Management", in The Water's Edge, Op. Cit., in note 53 (p. 215), pp. 189-211, at pp. 204-205. According to Bader et al "...migratory fish can be locked by thermal barriers. Therefore, power plants must be sited to avoid setting up such barriers in rivers or estuaries", Richard G. Bader, John M. Teal and Robert A. Ragotzkie, "Urbanization and Industrial Development", in The Water's Edge, Op. Cit., in note 53 (p. 215) pp. 103-124, at p. 113.

41. Langford, Loc. Cit., in note 39 (p. 285), at pp. 612-614.

42. Ibid. He further notes that: "Even as late as the 1960's, however, most sea water cooled power stations had to be shut down wholly or partly at least once each year so that fouling organisms, usually mussels and barnacles, could be removed. At Marchwood on Southampton water up to 130 tonnes were removed in a single cleaning operation, and at Pool Power Station

used.⁴³ Since chlorination of sea water is also essential for the extraction of magnesium and bromine, the effect of this chemical on living organisms will be discussed later.

(b) Indirect biological problems

These are caused by heated water discharged from the power plants. In tropical regions, for example, the destruction caused by higher temperature is greatest because marine organisms live at temperatures close to tolerance.⁴⁴ It has been suggested that in tropical regions during the summer no discharge should be allowed because the extra heat cannot be tolerated by the ecosystem.⁴⁵

The effect of thermal effluents discharged by the power stations is seriously destructive. In southern Biscayne Bay, Florida, many benthic organisms move out of the warmer inner bay during the summer months because of the extra heat caused by the thermal effluent discharge.⁴⁶

(Dorset) up to 300 tonnes of molluscs and other organisms were removed during one year". Ibid; see also J. Coughlan and J.W. Whitehouse, "Aspects of Chlorine Utilization in the United Kingdom", 18 Chesapeake Sci (1977), at p. 102.

43. Langford, Loc. Cit., in note 39 (p. 285), at p. 614.

44. Johannes, Loc. Cit., in note 35 (p. 282), at p. 368; McHugh et al, Loc. Cit., in note 40 (p. 286) at p. 112.

45. Ibid.

46. J.C. Zieman Jr, The Effect of a Thermal Effluent Stress on the Sea Grasses and Macro Algae in the Vicinity of Turkey Point, Biscayne Bay, Florida. Thesis, University of Miami (1970), cited by Johannes, Loc. Cit., in note 35 (p. 282), at p. 368.

According to Roessler and Zieman thermal effluent discharged from a power plant at Turkey Point destroyed all plants and gradually reduced animal population; mortalities extend to more than 1.5 km from the outfall.⁴⁷ Corals were among the first species killed at an even greater distance.⁴⁸

As well as direct destruction of some living organisms during the discharge the indirect effects of thermal pollution on living organisms have not yet been fully observed. Reeve and Cosper show that Copepodes (crustaceans) are greatly affected by the rise of temperature; they become ineffective and cannot swim and, therefore, sink to the bottom.⁴⁹ Studies on thermal pollution suggest, however, that the heated water discharged from the power plants have caused disturbances in breeding and migration of many species.⁵⁰ Perkins, in describing the problems of thermal

47. M.S. Roessler and J.C. Zieman Jr, "The Effects of Thermal Additions on the Biota of Southern Biscayne Bay, Florida", Proc. Gulf Carrib. Fish Inst. (1969) pp. 136-145, cited by Johannes, Loc. Cit., in note 35 (p. 282), at p. 368.

48. Ibid.

49. M.R. Reeve and E. Cosper, "Acute Effects of Heated Effluents on the Copepod", in Marine Pollution and Sea Life, Op. Cit., in note 35 (p. 282) pp. 250-252, at p. 251.

50. According to Davis, "The recent occurrence and breeding of Venus Mercenaria in Southampton waters is related to heated effluents and larvae transported by currents from Southampton to adjacent cold waters can settle, but could not breed (Ansell, 1963). Pennell, Johnson and Raymont (1962) reported that gribble prolonged their migration and breeding season in Southampton waters because of heated effluents. At Swansea, South Wales, Stubbings and Houghton (1964) observed that boreal crab, Carcinus Macnas, could not breed because of higher temperatures caused by heated

effluents and the increasing number of power plant stations in the past two decades, gives an account of the changes caused by them and says that:

"...for example, the new Fawley Power Station of the Central Electricity Generating Board has an output of 2,000 Megawatts and requires 50 x 100 gal/hr for the purposes of condenser cooling; this water experiences a rise of 80C, over the ambient on passing through the condensers".⁵¹

According to Perkins the direct and indirect effects of the heated water on marine organisms are as follows:

"Direct effects:

1. Death through the direct effect of heat, particularly upon flagellates, plankton and planktonic larvae;
2. Induction of physical aberrations, ie. in growth, respiration and feeding;
3. Interference with spawning and other critical activities;
4. Competitive replacement by more tolerant species;
5. Encouragement of exotics and unwanted pest species (exotics such as *Balanus amphitrite* are known to occur near some power stations);
6. Enhancement of toxicity of substances dissolved in sea water;
7. Effects upon the external metabolites.

Indirect effects include:

1. Loss of food supply, eg. death of flagellates of passage through the cooling water system, could adversely affect survival of larvae such as the oyster;
2. Changes in sedimentation regime could influence the biota;
3. Changes in the external metabolite regime could influence the populations and production of the estuary".⁵²

effluent". C.C. Davis, "The Effects of Pollutants on the Reproduction of Marine Organisms", in Marine Pollution and Sea Life, Op. Cit., in note 35 (p. 282), pp. 305-311, at p. 306.

51. Perkins, Op. Cit., in note 13 (p. 9), at pp. 576-577.

52. Ibid., at pp. 578-579; see also E. Naylor, "Effects of Heated Effluents upon Marine and Estuarine Organisms", 3 Advanced Marine Biology (1965) pp. 63-103.

Ciguatera (marine fish poisoning) is also alleged to be higher in tropical seas as a result of thermal effluents.⁵³

Finally, it must be added that the effects of radioactive waste discharged into the sea by nuclear power stations have not yet been fully studied. There is no doubt that nuclear power stations will increase in number in the future and, therefore, extensive research is needed to examine the effects of nuclear wastes on the ecosystem.⁵⁴

-
53. Donald P. de Sylva and Alden E. Hine, "Ciguatera- Marine Fish Poisoning- Possible Consequences of Thermal Pollution in Tropical Seas?", in Marine Pollution and Sea Life, Op. Cit., in note 35 (p. 282) pp. 594-596. For the thermal pollution caused by power stations in the North Sea see M.M. Sibthorp, The North Sea: Challenge and Opportunity, 1975, at pp. 34-36.
54. Rice et al have described the radioactive waste discharge by nuclear power plants and state: "The principal source of artificially produced radioactivity in estuaries will be radioactive waste from nuclear power plants. Although radionuclides in estuaries do not occur in sufficient quantities to damage fishery resources, they could, if permitted to increase without adequate surveillance and discharge limitations, become a threat to fisheries and to man. At present, there are 17 nuclear power plants in operation and 100 more planned or under construction in the USA. At least 41 will be located on sea coasts, estuaries, or on major rivers". T.R. Rice. J.P. Baptist, F.A. Cross and T.W. Duke, "Potential Hazards from Radioactive Pollution of the Estuary", in Marine Pollution and Sea Life, Op. Cit., in note 35 (p. 282) pp. 272-276, at p. 276. See also J.A. Hanson, "Energy for and with Open Sea Mariculture", in Open Sea Mariculture, Op. Cit., in note 12 (p. 8) pp. 334-355 at pp. 340-342.

iii. Extraction of Minerals from Seawater

Sea water contains almost all the naturally occurring elements.⁵⁵ The concentration of 64 elements has been measured but only the following 15 elements (Table 8) with higher concentrations can be optimistically looked at as resources likely to be extracted in the near future.⁵⁶

TABLE 8

Concentration of 15 Elements in Sea Water⁵⁷

Element	Concentration mg/h
1. Chlorine	19,000.0
2. Sodium	10,500.0
3. Magnesium	1,350.0
4. Sulphur	885.0
5. Calcium	400.0
6. Potassium	380.0
7. Bromine	65.0
8. Carbon	28.0
9. Strontium	8.0
10. Boron	4.6
11. Silicon	3.0
12. Fluorine	1.3
13. Argon	0.6
14. Nitrogen	0.5
15. Lithium	0.17

Of the 15 elements, sodium chloride in the form of common salt has been extracted for thousands of years.

55. John.L. Mero, The Mineral Resources of the Sea, 1964, at p. 24; see also Preston Cloud, "Mineral Resources From the Sea", in Resources and Man, Committee on Resources and Man, National Academy of Science- National Research Council, San Francisco, 1969, pp. 135-155, at pp. 137-141.

56. Cloud, Loc. Cit., in note 55 (p. 291).

In 1968, 35 million tonnes of sea salt or 29 per cent of world salt supplies were derived from the sea.⁵⁸

Magnesium has been extracted from sea water since 1935, but became very important during the Second World War.⁵⁹ Bromine and potassium as by-products of common salt and magnesium have also been extracted in large quantities. Magnesium with a gravity of 1.74 is the lightest of the metals and for this reason it is used in the aircraft industry. In 1968, 61 per cent of world production of magnesium came from the sea.⁶⁰ In 1977, there were 15 plants extracting this metal from sea water and the total production was about 2 million tonnes a year.⁶¹

57. The Table was first arranged by Goldberry in 1963 cited by Mero, Op. Cit., in note 55 (p. 291), at p. 26; see also Cloud, Loc. Cit., in note 55 (p. 291), at p. 138.

58. K. Warren, Mineral Resources, 1973, at p. 23; see also Edward Wenk Jr, "The Physical Resources of the Ocean", in Ocean Science, Op. Cit., in note 5 (p. 4), at p. 257.

59. W.C. Gilpin and N. Heasman, "Recovery of Magnesium Compounds from Sea Water", in Chemistry and Industry, 16 July, 1977, pp. 567-572, at p. 567. The various uses made of the production of magnesium compounds have been described Gilpin and Heasman as follows: "The greatest demand for magnesium compounds is that for magnesium oxide for (chemically) basic refractories to line the furnaces used in the production of steel, copper and other non-ferrous metals, cement and glass. Next comes magnesia for reduction to magnesium metal. Third is the use of magnesia in a variety of industries, including paper pulp, uranium extraction, construction, animal feed-stuffs, fertilisers, rubber and plastics, adhesives and most recently for preventing acid smut and corrosion in steam raising". Ibid, at pp. 567-568.

60. Warren, Op. Cit., in note 58 (p. 292), at p. 23.

61. Gilpin and Heasman, Loc. Cit., in note 59 (p. 292), at p. 567.

Bromine, on the other hand, is almost purely a marine element. It is estimated that "over 99% of the bromine in the earth's crust is in the ocean".⁶² It is also estimated that more than 70% of the world bromine supplies is extracted from sea water and this figure has changed little since 1968.⁶³ It must be noted that the concentration of bromine (65.0 mg/h) in sea water is much lower than that of magnesium (1,350.0 mg/h) and, therefore, the amount of sea water needed for its extraction is much higher. The amounts of water needed for the extraction of the above two elements are described as follows:

"Figures like a million gallons of sea water an hour for magnesium and more than twice this for bromine are typical of quantities handled by extraction plants".⁶⁴

In the case of both elements the sea water is treated with some chemicals mainly to remove bicarbonate and carbonate. These chemicals are mainly sulphuric acid, aniline

62. Mero, Op. Cit., in note 55 (p. 291), at p. 31.

63. Warren, Op. Cit., in note 58 (p. 292), at p. 23; Skinner and Turekian, Op. Cit., in note 2 (p. 3), at pp. 102-103. The first large scale extraction of bromine began on board a ship in the United States. Mero states that: "Working 25 days a month, the ship was capable of producing about 75,000 lb of bromine per month. One month's supply of reagents included 250 tons of concentrated sulphuric acid, 25 tons of aniline and 66 tons of chlorine stored between decks". Op. Cit., in note 55 (p. 291), at p. 32.

64. Loftas, Op. Cit., in note 28 (p.279), at pp. 139-140. Cloud describes some 12 elements which are likely to be extracted from sea water (see Table 8) and with regard to other elements he states that: "Omitting these 12 and with the possible exception of cesium, uranium, yttrium and remote outside chances for manganese and aluminium, the metal elements we might most like to extract from sea water offer little

and chlorine.⁶⁵ As was stated earlier, chlorine is also used in power plant stations for the prevention of culvert fouling. It has been observed by many marine scientists that chlorinated water reduces the photosynthetic activity in phytoplankton and kills many zooplankton, notably copepods.⁶⁶ According to Goldman et al:

"Growth rates of commercially important larvae, such as lobsters, appear to be seriously retarded after exposure to sublethal chlorine concentration".⁶⁷

promise for direct recovery". Loc. Cit., in note 55 (p. 291), at p. 140.

65. Gilpin and Heasman, Loc. Cit., in note 59 (p. 292), at 570-571; Mero, Op. Cit., in note 55 (292), at pp. 33-39.
66. According to Langford:
"Chlorine is obviously a very effective biocide. Once injected into a system, therefore, it can be expected to affect other entrained organisms, including fish larvae, oyster larvae and phytoplankton. Some attention has been given recently to the effect of cooling water chlorination on the survival of entrained organisms at marine sites, particularly in the United States. Several authors have shown suppressions of photosynthetic activity in phytoplankton varying from 25 to 98% after passage through power stations. Low concentrations of chlorine suppress bacterial activity very effectively although for phytoplankton the effects may also depend on the temperature of the cooling water.... The tolerance of zooplankton seems to vary from site to site, perhaps reflecting these factors and species differences. In the United States Heinle has reported up to 100% mortalities of copepodes after passing through a power station. At other sites, estimates vary from almost nil to 100%, depending upon chlorine concentrations and Ts, but most authors agree that mortalities in chlorinated systems tend to be greater than in non-chlorinated systems up to temperatures of 35-70C". Loc. Cit., in note 39 (p. 285), at p. 615. See also D.R. Heinle, "Temperature and Zooplankton", 10 Chesapeake Science (1969) at p. 186.
67. Joel C. Goldman, Judith M. Capuuzzo and George T.F. Wong, "Biological and Chemical Effects of Chlorination at Coastal Power Plants", in Water Chlorination, Environmental Impact and Health Effect, ed by Robert L. Jolley,

The amount of chlorine used in power stations in the UK is in the range of 0.5-1.0 ppm.⁶⁸ This quantity is said not to be any great danger to marine organisms.⁶⁹ In 1976, the total amount of chlorine used by the Central Electricity Generating Board in the United Kingdom was 10,000 tonnes out of a total use in the United Kingdom of 15,000 tonnes.⁷⁰

The amount of chlorine used in the extraction of magnesium and bromine is not known. It is, however, important to emphasise that chlorine is a very destructive agent which can have even greater effect on marine organisms than that of heated water.⁷¹ Although it has been established that various living organisms are affected by the chlorine used in cooling water and in the extraction of magnesium and bromine, the extent of the damage to the total population of living organisms is not known.⁷² On

Hend Gorchev and D. Heyard Hamilton Jr., Vol. 2, 1978, at pp. 291-304.

68. Langford, Loc. Cit., in note 39 (p. 285), at p. 615.

69. Perkins, Op. Cit., in note 13 (p. 9), at pp. 577-578.

70. Langford, Loc. Cit., in note 39 (p. 285), at p. 615.

71. According to Langford "Analysis of data from all kinds of research projects over the past 20 years suggests that many authors may have attributed fish mortalities or changes in invertebrate communities to heat, when chlorine may have been the main causal agent". Ibid.

72. Goldman et al, after describing the effects of chlorine on marine organisms state that:
"The implications of these findings are self-evident and represent perhaps the strongest condemnation of excessive chlorination use at power plants. The practice of dechlorination immediately after entrainment should be given consideration for coastal cooling systems. Although not discussed in this manuscript,

the other hand, it is even less certain to what extent the chlorinated sea water causes damage at the point of discharge or in surrounding areas. This problem has been discussed by Langford who states that:

"As chlorine reacts with organic matter in sea water, and there is a dilution and dispersion of residual chlorine in the receiving water, it is quickly undetectable, both chemically and in terms of immediate biological effects. Some doubts have been raised in the USA, for instance, about the ultimate rate of derived organic chlorine and its possible accumulation by biological processes. If we are to continue the widespread use of chlorine in UK power stations we will need to establish whether this happens and whether it contains a hazard".⁷³

In 1974, according to the US Bureau of Mines, some 2,169,000 tonnes of magnesium was produced from sea water.⁷⁴ States engaged in the extraction of magnesium from sea water were Canada, Ireland, Israel, Italy, Japan, Mexico, Norway, People's Republic of China, Soviet Union, United Kingdom and the United States.⁷⁵

the potential production of organochlorine compounds in chlorinated entrainments and their subsequent bio-accumulation throughout the food chain in receiving waters should be the subject of extensive research". Loc. Cit., in note 67 (p. 294), at p. 304.

73. Langford, Loc. Cit., in note 39 (p. 285), at p. 615; see also S. Jensen, A. Jernelov, R. Lange and K.H. Palmars, "Chlorinated By-Products from Vinyl Chloride Production: A New Source of Marine Pollution", in Marine Pollution and Sea Life, Op. Cit., in note 35 (p. 282), pp. 242-244.
74. Charlier, Loc. Cit., in note 19 (p. 276), at p. 276, Table 14.
75. Ibid.

iv. Legal Status of Seawater

Sea water is no longer simply a body of water containing resources. It is itself a resource and since it is used as a resource the legal validity of its exploitation must be discussed.

The exploitation of sea water for various purposes is usually carried out on or near the coasts where the water in question is within coastal States' territorial sea. Whether the legal status of sea water as a resource is the same as that of any other resources found in the territorial sea is not clear. The most fundamental question is: is there any legal distinction between the concept of 'territorial sea' and 'sea water'? The answer can only be found when the doctrine of the territorial sea in relation to coastal States' sovereignty is examined. It is the extent of coastal States' sovereignty over the territorial sea - recognised by international law - which will determine the legal character of the territorial sea. The form and extent of this sovereignty are valid if they are in accordance with the customary international law and international conventions.

The origin of the theory of the territorial waters began in the Middle Ages when the Glossators developed a doctrine according to which "the punitive power of the Emperor over offences committed at sea" was first recognised.⁷⁶

76. Percy Thomas Fenn Jr, "Origins of the Theory of Territorial Waters", 26 AJIL (1926) pp. 465-482.

This idea was further developed by Azo in the early thirteenth century. He asserted that as well as jurisdiction "private right may also be granted in the sea".⁷⁷

In the fourteenth century Bartolus gave a new dimension to the doctrine by stating that coastal waters were "under the exclusive jurisdiction of the ruler of the territory adjoining" and that the ruler (or State) had the right of "ownership over the island near the shore".⁷⁸

In the sixteenth century Gentilis stated his doctrine as a part of the law of nations. He said that:

"Coastal waters are a part of the territory of the State whose shores they wash. It follows that the territorial rights of sovereignty which exist in the head of State are extended in toto over the sea adjacent to his coasts".⁷⁹

A close examination of the doctrine of the territorial sea proves that the rights of coastal States have been subjected to gradual expansion as a result of the various activities carried out in that area. It began with coastal States' limited jurisdiction to punish crimes committed in adjacent waters and was further extended to fishing and security purposes.⁸⁰ During the eighteenth and nineteenth

77. Ibid, at p. 480.

78. Ibid, at p. 481. It is interesting to note that Bartolus considered that "islands within the distance of 100 miles belonged to the adjacent territory". Ibid. See also Fulton, Op. Cit., in note 89 (p. 54), at pp. 539-540.

79. Fenn Jr, Loc. Cit., in note 76 (p. 297), at p. 481; Fulton, Op. Cit., in note 89 (p. 54), at pp. 540-541.

80. Referring to various ordinances made by various States in the 18th century Fulton notes that:
"The various ordinances referred solely to the limit

centuries the width of territorial waters was settled. With a few exceptions States adopted the cannon shot rule or three miles limit.⁸¹ Although the width of territorial waters was generally agreed to be three miles, the extent of rights over the area remained undecided. The complication arising from the uncertainties of the coastal States' rights over their territorial waters can be illustrated in the English case of Regina v. Keyn in 1876.⁸²

of the territorial sea in relation to neutrality. But as early as 1747 the same boundary was applied to a limited part of the Norwegian coast in connection with fisheries. In that year a royal decree prohibited Russian fishermen at Finmarken from fishing within one league of the land - a measure which was not opposed by the Russian Government, and which was renewed by a Norwegian Law in 1830", Fulton, Op. Cit., in note 89 (p. 54), at p. 568. In the 17th century Loccenius, a Swedish author, held that: "As a general rule States had jurisdiction only in the waters adjacent to their coasts, for the preservation of peaceful navigation", Fulton, *ibid*, at pp. 550. The appropriation of territorial waters for fishery purposes was advocated by Puffendorf. In his book The Law of Nature and Nations (1672), he said: "If all nations should desire such a right and liberty (of fishing) near the coasts of any particular country, that country must be very much prejudiced in this respect, especially since it is very usual that some particular kind of fish, or perhaps some more precious commodity as pearls, coral, amber, or the like, are to be found only in one part of the sea, and that of no considerable extent. In this case there is no reason why the bordering people should not rather challenge to themselves this happiness of a wealthy shore or sea, than those who are situated at a distance from it", cited by Fulton, *ibid*, at p. 551.

81. Jessup, Op. Cit., in note 97 (p. 57), at pp. 3-10; Colombos, Op. Cit., in note 102 (p. 59), at pp. 91-95; Fulton, Op. Cit., in note 89 (p. 54), at pp. 555-566.
82. Regina v. Keyn (1876) 2 Exch.Div. pp. 63-239.

The case concerned a collision caused by negligence on the part of a German vessel as a result of which a British vessel 'Strathclyde' was sunk with the death of a passenger. The collision occurred within three miles of Britain's territorial waters and the facts relating to the collision, according to the reports, amounted to manslaughter in English Law.⁸³ It was held by the majority of the judges in the Court of Crown Case Reserved that:

"...on the ground that prior to 28 Hen. 8, C. 15, the admiral had no jurisdiction to try offences by foreigners on board foreign ships, whether within or without the limit of three miles from the shore of England; that that and the subsequent Statutes only transferred to the Common Law Courts and the Central Criminal Court the Jurisdiction formerly possessed by the admiral; and that, therefore, in the absence of statutory enactment, the Central Criminal Court had no power to try such an offence".⁸⁴

During his judgement, Cockburn C.J. examined the doctrine of the territorial waters and that of coastal

83. According to Jessup:

"This case arose out of a collision two and a half miles from Dover Beach, between the British Steamer Strathclyde and the German ship Franconia, the latter being at fault. Keyn was in command of the Franconia, and was tried in the Central Criminal Court at London for the manslaughter of one Young, a passenger on the Strathclyde, who was killed in the collision. At the close of the Case for the prosecution in the Lower Court the Counsel for the prisoner objected that the Court had no jurisdiction. The judge, without giving any reasons, overruled the objection and at the close of the prisoner's case the Jury found him guilty. According to the statement in the report 'The question for the opinion of the Court for Crown Cases Reserved was whether the Central Criminal Court had jurisdiction'", Jessup, *Op. Cit.*, in note 97 (p. 57), at pp. 124-130.

84. Regina v. Keyn (1876) 2 Exch Div. at p. 63. See also H. Lauterpacht, Private Law Sources and Analogies of International Law, 1970 (reprint), at p. 76.

States' sovereignty and stated inter alia:

"In the result, looking to the fact that all pretension to sovereignty or jurisdiction over foreign ships in the narrow sea has long since been wholly abandoned - to the uncertainty which attaches to the doctrine of the publicists as to the degree of sovereignty and jurisdiction which may be exercised on the so-called territorial sea - to the fact that the right of absolute sovereignty therein, and of penal jurisdiction over the subjects of other State, has never been expressly asserted or conceded among independent nations, or, in practice, exercised and acquiesced in, except for violation of neutrality or breach of revenue or fishery laws, which, as has been pointed out, stand on a different footing - as well as to the fact, neither in legislating with reference to shipping, nor in respect of the criminal law, has Parliament thought proper to assume territorial sovereignty over the three-mile zone, so as to enact that all offences committed upon it, by foreigners in foreign ships, should be within the Criminal Law of this country, but on the contrary, whenever it was thought right to make the foreigner amenable to our law, has done so by express and specific legislation".⁸⁵

85. Ibid., at pp. 230-231, see also *ibid*, pp. 204-207.

According to Marsden:

"Until the passing of the Merchant Shipping Act Amendment Act, 1862, which preceded the present Acts, there was frequently great difficulty, in cases where one or both the ships in collision were foreign, in determining whether the municipal law limiting owner's liability was, or was not, applicable. At the present day no such difficulty can arise. Whether the ships are both British, or both foreign, or one British and one foreign, and whether the collision occurs in British waters or on the high seas, the limit of owner's liability is the same, namely, that fixed by the Merchant Shipping Act, 1894, s. 503, as amended by the Merchant Shipping (Liability of Shipowners and Others) Act 1958 and other Acts". Reginald G. Marsden, The Law of Collision at Sea, British Shipping Laws, Vol. 4, ed by K.C. McGuffie, 11th ed (1961) Paragraph 272. It must be pointed out that "the provisions of the Merchant Shipping Act, 1854, did not, in terms, apply to foreigners. Under this Act it was held that the liability of the owners of a British Ship in collision with a foreigner, within three miles of the shore of the

The above case proves that the extent of coastal States' jurisdiction over the territorial waters was limited, and therefore, coastal States' sovereignty over the land

United Kingdom was limited". Marsden, *ibid*, at p. 269 (Footnote 74). The cases in question were The Fyenoord (1858) S.W. 374, The William Hutt (1860) Lush. 25, General Iron Screw Collier Company v. Schurmanns (1860) 1 J. & H. 180, Zollverein (1856) 27 L.T. (O.S.) 160; SW. 96. In The Saxonia Dr Lushington stated that: "When a British ship and foreign ship meet on the high seas, the usual rule is, that the Statute (Merchant Shipping Act 1854) is not binding: clearly it is not binding on the foreigner; and if it were considered binding on the British vessel, the British vessel would manifestly be under an undue disadvantage. I believe the practice of applying the maritime law to such cases has been followed universally up to the present moment, and I hold such to be the law. But I am urged to apply the Statute not only in consequence of the Case of The 'Fyenoord', but of the Case of The 'William Hutt' (1 J. & H. 180), because these vessels, the 'Eclipse' and the 'Saxonia', were between the coast of Hampshire and the Isle of Wight. If, however, I had a difficulty in applying the Statute to foreign ships in the River Thames, I have greater difficulty in applying it to them in the water between the Isle of Wight and the mainland, and in saying that all ships going through those waters are bound by our regulations. I should hesitate before I came to that conclusion; and in the extreme case, that of a vessel sailing along the North Sea, and within three miles of the coast, my difficulty would be absolutely insuperable, because I am clearly of opinion that a foreign vessel has a right of so doing, without being bound by any of our rules whatever". See the Text in English Reports 167, Ecclesiastical, Admiralty, and Probate and Divorce VII containing Lushington; Browning and Lushington; Burrell, 1924, at p. 181. When this case went before the Privy Council, the Master of the Rolls, observed that: "In our opinion the Statute (M.S. Act 1854) cannot be considered to have any local application to the Solent, so as to affect foreign as well as British vessels navigating within the limits of the Channel; and that even if the Statute were binding on all vessels navigating within a tidal river, which, however, the case of The 'Fyenoord' (Swab. 377) discounts, we think that it could not be locally binding within the water of the Isle of Wight and the mainland, and that the circumstance that the Isle of

territory did not automatically extend to their territorial waters.⁸⁶

As a result of the decision in Regina v. Keyn the Territorial Waters Jurisdiction Act was passed in 1878.⁸⁷ Section 7 of the above Act stated that:

"Any part of the open sea within one marine league of the coast measured from low-water mark shall be deemed to be open sea within the territorial waters of Her Majesty's dominion".⁸⁸

Even after this Act the extent of rights over the territorial waters remained uncertain. In the case of Attorney General of British Columbia v. Attorney General for Canada the Privy Council considered that:

"...it was not desirable that any municipal tribunal should pronounce on the doctrine of territorial waters until the Powers have adequately discussed and agreed at a conference on its meaning".

It concluded that until that was achieved:

Wight is by local and territorial designation to be deemed a portion of the county of Southampton does not in any degree affect this question". See English Reports 167, Op. Cit., in this note (p. 302), at p. 105.

86. See Jessup, Op. Cit., in note 97 (p. 57), at pp. 124-133.

87. 41 & 42 Vic. C. 73. The decision of the majority judges (7 to 6) in R v. Keyn has been subject of controversial views in other cases; some of which very recent. See for example United States v. California 332 U.S. 19 (1947), United States v. Texas 339 U.S. 707 (1950), United States v. Maine & Others 420 U.S. 515 (1975), Reference re Offshore Mineral Rights of British Columbia (1967) S.C.R. 792, New South Wales & Others v. Commonwealth of Australia (1975) 135 C.L.R. 337, 367. See also Marston, Op. Cit., in note 15 (p. 25), at pp. 114-151 and at pp. 270-274; John Gibson, "The Ownership of the Sea Bed Under British Territorial Waters", Vol. VI, No. 2, International Relations, November 1978, pp. 474-499; Rowland J.

"...no conclusion was likely to be reached on the question whether the shore below low water mark to within three miles of the coast forms part of the territory of the Crown or is merely subject to special powers necessary for protective and police purposes".⁸⁸

Harrison, "Jurisdiction Over the Canadian Offshore: A Sea of Confusion", Vol. 17, No. 3, Osgood Hall Law Journal, December 1979, pp. 469-505, Geoffrey Marston, "The Century of the Franconia Case - The Prosecution of Ferdinand Keyn", Vol. 92, The Law Quarterly Review (1976), pp. 93-107.

88. (1921) 1. A.C. 413 at p. 431; see also O'Connell, International Law, Vol. 1, at pp. 467-472. Marston, referring to the historical basis of the claim to territorial waters in England, notes that: "There is a substantial body of opinion which considers that the traditional claim was abandoned, either on the demise of the Stuart dynasty, or later. Cockburn C.J. expressed this most forcefully when he remarked in Keyn that 'these assertions of sovereignty were manifestly based on the doctrine that the narrow seas are part of the realm of England. But that doctrine is now exploded...when the sovereignty and jurisdiction from which the property in the soil of the sea was inferred is gone, the territorial property which was suggested to be consequent upon it must necessarily go with it'. A similar view was advanced by the Judicial Committee of the Privy Council in the British Columbia fisheries case of 1913 where it stated that the 'three-mile limit' owed its origin to 'comparatively modern authorities of public international law'. Furthermore, the Cockburn view has been endorsed by the Supreme Courts of the United States, and of Canada, and by some members of the High Court of Australia". Op. Cit., in note 15 (p. 25), at p. 270. But according to Marston: "The Crown's claim to sovereignty, or at least jurisdiction, over large tracts of sea surrounding the British Isles was relevant in an international context, largely of the flag-salute and the enforcement of hovering legislation over foreign vessels... the tacit abandonment of the wide claim in respect of the surrounding waters need not have involved the abandonment of the traditional claim to the solum it is submitted that the traditional claim was not abandoned at any time prior to the reception of the doctrine of territorial sea, nor has it been abandoned since". Ibid, at p. 272.

From the beginning of this century the concept of coastal States' sovereignty over the territorial waters has developed further. Professor O'Connell noted that:

"...within the past thirty years there has been a growing tendency to refer to 'sovereignty' over the territorial sea in conventions, arbitrations and other international transactions, while the growth of the continental shelf doctrine has assimilated the seabed both within and without the territorial sea to the legal status of dry land. Most of the States which commented to the Preparatory Committee for the Conference for Codification of international law in 1932, and those which commented on the drafts of the International Law Commission, accepted the usage of the term 'sovereignty' in relation to territorial waters..... However, one cannot conclude from the employment of this term that States regard territorial waters as for all purposes part of their territory. The term 'sovereignty' is an evasive one, and the distinction between imperium and dominium which underlies much Continental Jurisprudence in this field suggests some caution in equating 'sovereignty' with the public domain".⁸⁹

The doctrine of the territorial waters has, therefore, developed its legal character with specific references to its importance for security and fisheries. There has never been a single reference, whether in municipal laws or international law to sea water itself as a resource to the exploitation of which some rights and duties can be imposed.

The importance of the interrelationship between the living organisms of the coastal zone and their environment has already been discussed.⁹⁰ The water covering the

89. O'Connell, International Law, 1970 (2nd. ed.), Vol. 1, at p. 469.

90. See above pp. 198-220.

continental shelf, whether within the limit of the territorial sea or outside that limit, is a very important part of that interrelationship. Any changes in its salinity or temperature, i.e. chemical and physical factors, can adversely affect the biological productivity of the coastal zone. Sea water is not stationary and, therefore, cannot be divided by any imaginary line when under exploitation. As in the case of migratory species which require certain obligations and duties to be accepted by States for their protection the water itself should be given some protection. The unity of the marine environment and the need for its protection at regional and global level has become so important that the inclusion of sea water within absolute sovereignty of coastal States over territorial waters cannot justifiably be defended.⁹¹ The importance of this unity has been outlined in article 1, of the UNCLOS III Draft Convention on Protection and Preservation of the Marine Environment, which states:

"Pollution of the marine environment means the introduction by man, directly or indirectly, of substances or energy into the marine environment (including estuaries) which results or is likely to result in such deleterious effects as harm to living resources, hazards to human health, hindrance to marine activities including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities".⁹²

91. See below iv (3).

92. Doc. A/CONF. 62/WP.8/Rev. 1, Part III. The above definition was originally introduced and adopted in 1970 by the UN Group of Experts on Scientific Aspects of Marine Pollution. See James Barros and D.M. Johnston,

Although the recognition of the unity of the marine environment is most encouraging with regard to the inclusion of estuaries within that unity, the text is still far from satisfactory to meet ever-increasing uses of sea water. It gives coastal States complete discretion in assessing the extent of pollution which, in the light of divergent interests and priorities, may give rise to different interpretations of harmful substances on the one hand and the extent of their effects on the marine environment on the other. It was discussed earlier that the extraction of minerals, desalination and the use of sea water for cooling power plants inevitably result in the introduction of chlorine and other harmful substances into marine environment. The heated water itself is fatal in the tropics and causes damage to some species in other areas. The damage caused by these activities is not always immediate and local. Many species affected by such causes travel hundreds of miles and through various regions and, therefore, to trace the time and the place of damage is extremely difficult.

Sea water has not yet been considered as a resource and, therefore, the legal concepts associated with it have not been clarified although its exploitation as a resource, and the subsequent effects on the marine environment are very much in evidence.

B- Non-living Resources of the Seabed of the Continental Shelf

Introduction

The exclusive right of coastal States to exploit mineral and other non-living resources of the seabed of the continental shelf beyond the territorial waters was first claimed by the United States in a Proclamation of 1945.⁹³ This right, which was claimed by many other coastal States, was subsequently confirmed in article 2 of the 1958 Geneva Convention on the Continental Shelf which referred to coastal States' sovereign rights over "mineral and other non-living resources of the seabed..." of the continental shelf.⁹⁴

Although the sovereign rights of the coastal States over mineral and other non-living resources of the seabed of the continental shelf have remained intact since 1958, two major changes have taken place regarding the continental shelf and the exploitation of its resources. First, the definition of the continental shelf based on 200 metres depth and exploitability criterion which appeared in article 1 of the 1958 Convention has been challenged by the International Court of Justice in the North Sea Continental Shelf Cases since 1969.⁹⁵ The Court decided that sovereign rights conferred on coastal States were valid to the full extent that the submarine area was a "natural prolongation" of the land

93. See above pp. 72-86.

94. See above pp. 175-194.

95. North Sea Continental Shelf Cases, Judgment, ICJ Report, 1969. See also below Chapter IX (C).

territory.⁹⁶

The above decision by the ICJ has become the most important element in the definition of the continental shelf proposed in the Draft Convention negotiated by the UNCLOS III.⁹⁷ The important implications of this definition for the exploitation of resources will be discussed later.

Secondly, the exploitation of mineral and other non-living resources of the seabed of the continental shelf such as phosphorite, glauconite, calcareous, barium, sulphate, organic sediments, sand and gravel, platinum, gold, diamond and tin has become a major enterprise in many coastal States. More resources in ever greater quantities are being exploited. Since this presents certain dangers to the natural ecosystem the extent of the exploitation, the way this exploitation is being conducted and its effects on the biological productivity of the coastal zone need to be examined. We shall discuss whether the sovereign rights of coastal States over mineral and other non-living resources of the seabed of the continental shelf can or should remain unrestricted by international law in the light of the expansion of the industries engaged in this exploitation.

96. Judgment, p. 31, para. 43. See below Chapter IX (C).

97. Article 62 of the ISNT (A/CONF. 62/WP 8/Part II, 7 May, 1975); Article 65 of RSNT (A/CONF. 62/WP 8/Rev. 1. Part I, 6 May, 1976); Article 76 of the ICNT (A/CONF. 62/WP 10, July 1977) and Article 76 of the ICNT (A/CONF. 62/WP 10/Rev. 3, 27 August 1980).

The mineral and other non-living resources of the seabed of the continental shelf can be divided into four separate groups. This classification is based on the purposes for which these deposits are being exploited.

They are:

- i. Materials for Construction
- ii. Materials for Fertilizing
- iii. Minerals (metallic)
- iv. Precious Minerals

It should be emphasised that not all continental shelves contain such deposits. The kind of deposits present and the quantity of the resources vary from one continental shelf to another. In this section the exploitation of various resources in each group, including the extent of exploitation, the way it is carried out and its effects on the marine environment will be discussed. It is important to point out here that exploitation of the various resources of the seabed of the continental shelf is carried out by dredging operations which can result in serious damage to the ecology of the coastal zone. Examination of the biological effects of dredging operations on the continental shelf will show whether the present legal regime governing such activities has taken sufficient precautions to ensure that the natural balance of the ecosystem remains intact. Furthermore, we shall examine whether the results of dredging operations extend beyond the coastal States' jurisdiction and are, therefore, a cause for international concern.

i. Materials for Construction

Continental shelf sediments are all terrigenous; that is to say, they are derived from the land and are divided into two groups. First, relict sediments, otherwise referred to as ancient, unconsolidated sediments which form 70 per cent of the sediments in the continental shelf and second, modern sediments, forming at the present time, which comprise the remaining 30 per cent of sediments on the continental shelf.⁹⁸ The former sediments contain sand, gravel, phosphorite, tin, heavy minerals and some precious materials such as gold and diamond.⁹⁹

Building materials include sand, gravel, shell, cement, plaster, glass, asbestos and ceramic clays. Of these sand, gravel and shell are obtained in large quantities from the continental shelf.¹⁰⁰ These materials have been dredged from the offshore seabed for nearly 50 years, Britain being the first country to exploit sand and gravel off its coasts.¹⁰¹

The extraction of sand and gravel from the seabed of the continental shelf is increasing rapidly. In 1967 the total tonnage of sand and gravel dredged from the United Kingdom offshore up to a depth of 90 feet, amounted to 8

98. Meadows and Campbell, Op. Cit., in note 11 (p. 200), at pp. 80-81.

99. E. Wenk Jr, "The Physical Resources of the Ocean", in Ocean Science, Op. Cit., in note 5 (p. 4), at p. 261.

100. Skinner et al, Op. Cit., in note 2 (p. 3), at p. 55.

101. Richard G. Bader and Robert A. Ragotzkie, "Non-renewable Resources", in The Water's Edge, Op. Cit., in note 53 (p. 215) pp. 63-83, at p. 75.

millions.¹⁰² By 1970 some 32 companies were operating 75 dredges at 80 different sites in 6 principal areas and the production rose to 20 million tonnes in 1971.¹⁰³ As much as one quarter of this was exported to Holland, Belgium, France and West Germany.¹⁰⁴

In addition to the South and South East coast of England which have traditionally been dredged, the coasts of the North Sea have been dredged for these materials since the early 1960s.¹⁰⁵ Sand, gravel and shell dredging off the coasts of the United States has also become a major industry. Wenk states that:

"...of the many potentially valuable surface deposits, sand and gravel are the most important in dollar terms, and only these and oyster shells are now mined off the US coast. Some million tons of oyster shells are extracted from US continental shelves annually as a source of lime; sand and gravel run about 50 million cubic yards".¹⁰⁶

Japan is also extracting large amounts of sand and gravel from its continental shelf and it is believed that the Japanese have been obtaining iron from gravel dredged up from the seabed for many years.¹⁰⁷

The per capita consumption of building materials is

102. Warren, Op. Cit., in note 58 (p. 292), at p. 24.

103. Bader and Ragotzkie, Loc. Cit., in note 101 (p. 311), at p. 74.

104. Ibid., at pp. 74-75.

105. Sibthorp, Op. Cit., in note 53 (p. 290), at pp. 73-74.

106. Wenk Jr, Loc. Cit., in note 99 (p. 311), at p. 261.

107. Loftas, Op. Cit., in note 28 (p. 279), at p. 134; see also Charlier, Loc. Cit., in note 19 (p. 276), at p. 182.

rising rapidly. In the United States the rate was between 4 and 5 tonnes per year in the early 1970s.¹⁰⁸ In many coastal areas in the United States and Western Europe the onshore sources of sand and gravel are being rapidly depleted while the per capita consumption of these commodities continues to rise. According to Skinner:

"Where land resources are being depleted too rapidly, exploration and exploitation of off-shore marine sandbars may also be employed. An interesting situation has now been reached in both Europe and North America. Population densities in coastal areas above about 40 degrees north latitudes have very nearly consumed all the sand and gravel. It is precisely in these high latitudes, however, that extensive sand and gravel deposits occur on the continental margins, having been deposited there by glaciers during the height of the recent ice age. These communities, therefore, have alternatives; either quarry and crush rock or dredge the sand and gravel from beneath the sea. Off the West coast of Europe approximately \$ 100 million worth of sand and gravel are now being dredged each year. In North America dredging has commenced in a small way, and it can be expected to grow in the years ahead, particularly off the shores of New Jersey, New York and New England states".¹⁰⁹

An important factor contributing to the future development of sea bed dredging is the size of the population which tends to be higher along the coasts. Mero notes that:

"As much of the population of the world is concentrated along sea coasts, the floor of the ocean is quite possibly a major future source of this material. Many beaches have been or are now being mined for sand and

108. Skinner et al, Op. Cit., in note 2 (p. 3), at p. 55; B.H. Ketchum and B.W. Tripp, "A Summary of Results and Conclusions", in The Water's Edge, Op. Cit., in note 53 (p. 215) pp. 3-32, at p. 12.

109. Brian Skinner, Earth Resources, 1976, at p. 121.

gravel".¹¹⁰

On many tropical and subtropical coasts the absence or low quantity of gravel have made oyster shells, clam shells and coral reefs very valuable since they are used as substitutes for gravel in building aggregates.¹¹¹ The present exploitation and the future prospects of the shell industry have been described by Skinner and Turekian.¹¹² Cockle shells are also used as building material.¹¹³ As well as being used directly for construction, shells are used for cement manufacture.¹¹⁴ They are also used in the precipitation of magnesium from sea water.¹¹⁵

110. Mero, *Op. Cit.*, in note 55 (p. 291), at p. 77.

111. Skinner et al, *Op. Cit.*, in note 2 (p. 3), at p. 56.

112. According to Skinner et al, "Shells and corals lack the high strength of gravels and crushed rock but are considerably lighter because they are porous. Consequently, concrete prepared from them has desirable weight properties, but is less strong. Oyster shells are widely used around the world. In Texas and Louisiana, for example, these shells continue to be the major concrete aggregate and road-building base used. Most of the onshore supplies have already been depleted and all further production will occur offshore. Clam shells although not so widely used are also important and in some areas, such as Southern Alabama, are the major building material". *Ibid.*

113. Novak notes that:
"In the last few years there has been yet another outlet for the cockle shell. A Dundee architect discovered that when suitably crushed, the cockle shell is also suitable for facing houses with a rough cast, and they are now being used quite extensively for this purpose". *Op. Cit.*, in note 92 (p. 234), at p. 52.

114. *Ibid.*, at p. 53; Skinner et al, *Op. Cit.*, in note 2 (p. 3), at p. 56.

115. Mero, *Op. Cit.*, in note 55 (p. 291), at pp. 55-56.

ii. Material for Fertilizers and Animal Feed

The principal materials which have been extracted from sea bed of the continental shelf for the purposes of fertilizing and animal feed are phosphorite, shells and glauconite. The current exploitation of these materials and their future prospects are discussed separately.

1. Phosphorite - This material is very much in demand for fertilizing and although there is no shortage of phosphorite on land the demand is increasing very rapidly as more countries have entered the era of modern agriculture.¹¹⁶ The total production of phosphorite increased from just over 40 million tonnes in 1963 to almost 100 million tonnes in 1973.¹¹⁷ The production came from land resources although large deposits of this material have been found off the coasts of Japan, South Africa, Argentina and the east coast of the United States.¹¹⁸

116. Charlier states that:
"Even rapid expansion of agricultural demand would not put a great dent in the 21,500 million tonnes of reserves. Land production, however, contributes to pollution, conflicts with conservation measures, and, because of bulk, results in high transportation costs. These considerations are the major factor for looking toward the sea". Loc. Cit., in note 19 (p.276), at p. 189.

117. According to Skinner et al:
"The tonnages of phosphorite on or close to the sea floor, and therefore accessible by dredging operations, are enormous. The largest known tonnages are on the East and West coasts of North America, but exploration of other continental margins will probably reveal large deposits in other parts of the world. It is estimated that off the coast of Southern California and that portion of Mexico known as Baja California, 25,000 km² of the sea floor contain phosphorite nodules lying on the bottom, most of which is no deeper than 550 meters". Op. Cit., in note 2 (p. 3), at

There are both political and economic factors contributing to sea bed exploitation of phosphorite. Mero, referring to the former factor states that:

"The principal producers of phosphate rock are the United States, Morocco, USSR, Tunisia, and four islands of the Pacific and Indian Oceans...while there is no worldwide shortage of phosphorite, only eight nations hold over 98 per cent of the world's resources. Major consumers of this vital material such as Japan, Great Britain, Germany and Australia must import large quantities of it. All nations of the world using modern agricultural methods must manufacture and use phosphate fertilizers".¹¹⁹

As a result of the, more or less, monopoly of phosphorite by few States on the one hand and increasing demand for this material in the world on the other hand, the price of phosphorite has been rising. This provides the second reason for extracting phosphorite from the sea bed where and when it is possible. According to Charlier:

"Clumps of phosphorite appear often near shore, at less than 100m depths, and mining leases for them have been granted over 12,000 ha of southern California. The fertilizer could have been placed on the market in 1963 at \$13.50 a ton, when \$15 was the price tag for the imported product. In 1973, the phosphorite mined on land in coastal North Africa and Florida was worth \$13, and a ton of the marine product costs only \$6. With the Arab producer heading a pricing organisation, 1 ton was priced at more than \$17 in 1976, and the price might still go up".¹²⁰

The reasons why this important material has not yet been extracted from the sea bed of the continental shelf

pp. 47-48.

118. Mero, Op. Cit., in note 55 (p. 291), at p. 58.

119. Mero, Op. Cit., in note 55 (p. 291), at p. 58.

120. Charlier, Loc. Cit., in note 19 (p. 276), at pp.186-189.

are as follows: first, the phosphorite lying on the sea bed is not as rich as phosphate found onshore.¹²¹ Secondly, since there is no shortage of phosphorite on land, coastal States have so far been reluctant to extract this resource from the sea bed.¹²² Finally, as well as economic reasons there is an important biological reason which prevents the utilization of marine phosphorite. According to Bader and Ragotzkie:

"...mining of phosphorite, which usually underlies salt marshes, involves a more permanent cost. Stripping off marshes to recover the phosphorite permanently destroys their productivity and nursery ground function - a cost which would in all probability be an unacceptable consequence of the recovery of this resource".¹²³

2. Shells - It was described earlier how oyster and various other shells are dredged and used for construction purposes and for the extraction of lime and cement. Shells are equally important in supplying calcium carbonate which is used as a source of lime in agriculture. Furthermore, shells are used as an ingredient of chicken feed, pet food and livestock supplement.¹²⁴

As a source of fertilizer and animal feed shells are generally divided to 'live' and 'dead' shells. The former are derived from shellfish factories while the latter are

121. Skinner et al, Op. Cit., in note 2 (p. 3), at p. 47; Charlier, Loc. Cit., in note 19 (p. 276), at p. 189.

122. Skinner et al. Op. Cit., in note 2 (p. 3), at p. 48.

123. Loc. Cit., in note 101 (p. 311), at p. 64.

124. Ibid., at p. 73; Skinner et al, Op. Cit., in note 2 (p. 3), at pp. 56-57.

dead shells lying in large quantities for centuries on the sea bed. The shellfish industry in many parts of the world relies heavily on the by-products of the shellfish.¹²⁵

Oyster shells which are an important building material are also used as a source of fertilizer and animal feed.¹²⁶

Mero has described the quantities of shell deposits in the Gulf of Mexico and states that:

"The shell deposits are found along the coasts of other Gulf Coast States and as far south along Florida as Cape Romano. Layered deposits of these shells have been found that measures over 25 ft in thickness.... These deposits are mined to some degree in all the Gulf Coast States. Since 1940 companies in Texas alone have mined over 45 million tons of shell for use in various industrial processes".¹²⁷

3. Glauconite - This material is an authigenic material defined as "a hydrated potassium, iron, aluminium silicate".¹²⁸ It was once considered to be a major potential source of potash and potassium compounds as agricultural fertilizer.¹²⁹

125. Novak, Op. Cit., in note 92 (p. 234), at p. 52.

126. According to Novak, "The by-products of the oyster industry are of some importance. Like cockle shells, the shell of the oyster makes excellent cultch, and is much sought after by oyster planters. It is also used for poultry food, especially in America... The Southern Oyster Shell Mining Co, of USA produces large bags of chicken food with a calcium carbonate content of 99 per cent. Oyster shell can also be converted into top quality garden and agriculture lime". Ibid., at pp. 52-53 and pp. 166-167.

127. Mero, Op. Cit., in note 55 (p. 291), at pp. 52-53.

128. Ibid., at p. 73; Cloud, Loc. Cit., in note 55 (p. 291), at p. 146.

129. Mero, Op. Cit., in note 55 (p. 291), at p. 50.

Large deposits of glauconite have been found off the coasts of many countries although they have not yet been commercially exploited. There are two factors preventing the exploitation of glauconite: first, there are other sources of potassium available on land, and secondly, unlike other resources glauconite deposits are accumulated in deeper water. Glauconite has been found off the east coast of Australia, off the coasts of Portugal, West Africa, eastern North America, off the coast of South Africa, along the coast of California, off the coast of New Zealand, China, Japan, the Philippines, Scotland and Western South America.¹³⁰

iii. Minerals (metallic) from the Seabed of the Continental Shelf

Metallic minerals which have been found and extracted from the sea bed of the continental shelf include cassiterite, magnetite, chromite, rutile, ilmenite, monazite and zircon.¹³¹ These minerals are usually referred to as detrital deposits and the heavy minerals commonly recovered from them are shown in Table 9 (p. 320).

These minerals were all derived from the land by rivers when the sea levels were lower and both the rivers and the wave currents have acted as concentrating agents.¹³²

130. Ibid., at p. 73.

131. Skinner et al, Op. Cit., in note 2 (p. 3), at p. 50.

132. H.W. Menard, Geology, Resources and Society, 1974, at pp. 286-288.

TABLE 9 *

Mineral	Density grams/cc	Principal form used	Type of detrital deposits
Cassiterite	7.0	Metallic Tin	stream and offshore
Magnetite	5.0	Metallic Iron	offshore
Rutile	4.3	Titanium Oxide	offshore
Chromite	4.5	Metallic Chromium	stream and offshore
Ilmenite	4.7	Titanium Oxide	offshore
Monazite	5.0	Rare-earth Chemical	offshore
Zircon	4.7	Zirconium Sili- cate	offshore

Materials with lower densities such as clay and granite were washed away while these minerals remained.¹³³

*. The Table has been arranged by Skinner et al, Op. Cit., in note 2 (p. 3), at p. 50.

133. According to Skinner et al, "Most minerals are not stable at the earth's surface, being slowly decomposed by weathering to fine-grained products such as clay. Some materials, however, are very resistant to chemical weathering. If they are further resistant to abrasion and have a relatively higher density than quartz and clay, then water and wind actions cause separation between the 'heavy' residues and the lighter alteration products. The concentrations of heavy residues are called detrital deposits where extensive winnowing by stream waters may become very rich". Ibid, at pp. 49-51.

Detrital deposits are generally divided into two groups:

(a) Detrital deposits whose concentrations have been caused by "extensive winnowing by stream waters or near-shore currents".¹³⁴ These deposits are usually concentrated on the sea bed of the continental shelf. Skinner et al have described this concentration in the following terms:

"Because of the need for strong wave and current action to effect concentration it is unlikely that detrital deposits will be discovered beyond 200 meter depth; but even with this limitation, potential reserves of ilmenite along the Atlantic coastal shelf of the United States may be as large as 10⁹ tons, more than ten times as large as the onshore resources... We suspect that production of detrital deposits along the continental margins will grow rapidly during the decades ahead as exploration of the shelves proceeds".¹³⁵

A classic example of stream-derived deposits formed during a period of lower sea levels and worldwide glaciation is cassiterite which contains metallic tin. Tin is among the scarce metals and, therefore, it is expected that further exploitation of cassiterite from the sea bed of the continental shelf is likely to develop. Currently, one of the world's major sources of tin is the Far East off the coasts of Thailand and Indonesia.¹³⁶ Mero notes that "in Thailand, the tin minerals are contained in alluvium submerged to a depth varying from 90-130 feet. The deposits

134. Ibid., at p. 51.

135. Ibid., at p. 54; Cloud, Loc. Cit., in note 55 (p. 291), at p. 141.

136. Skinner et al, Op. Cit., in note 2 (p. 3), at p. 100; Warren, Op. Cit., in note 21 (p. 277), at pp. 169-171.

are known to extend from the present shoreline to a point 5 miles at sea. Possibly they extend even farther offshore".¹³⁷ Dredging operations have been carried out off the coasts of Thailand since 1957.¹³⁸ Exploitation of cassiterite by dredging is also carried out off the coasts of Indonesia.¹³⁹

(b) Detrital deposits which have been formed by ocean currents and are not, generally, as rich as the first type. Nevertheless, deposits of zircon and rutile found off the east coast of Australia are the world's major source of these heavy minerals. According to Skinner et al:

"Frequent reworking of old beach deposits by wave action as the sea level rises has produced a number of rich detrital deposits. Although rarely as rich as their stream-derived counterparts, the beach deposits may be very extensive. Indeed, the world's major source of zircon and rutile is from beach sands along the eastern coast of Australia".¹⁴⁰

In 1961, the Japanese began to extract iron ore from the sea bed from the bottom of Ariake Bay by dredging operations.¹⁴¹ By 1963, the production rose from 1,000 to 30,000 tonnes a month.¹⁴² According to Charlier, constructions for exploitation of detrital deposits are under way in the United States, the Soviet Union and Japan.¹⁴³ In the early

137. Mero, Op. Cit., in note 55 (p. 291), at pp. 78-79.

138. Ibid. Charlier, Loc. Cit., in note 19 (p. 276), at p. 196.

139. Mero, Op. Cit., in note 55 (p. 291), at pp. 78-79. Japan, Soviet Union and the United States are also developing their mining techniques for the extraction of tin from the sea bed. Charlier, Loc. Cit., in note 19 (p. 276), at pp. 196-197.

140. Skinner et al, Op. Cit., in note 2 (p. 3), at p. 53.

141. Charlier, Loc. Cit., in note 19 (p. 276), at p. 196.

142. Ibid.

143. Ibid. According to Charlier "the largest tin-ore

1970s the beach and offshore production of detrital deposits amounted to 7 per cent of the world's total production of these minerals.¹⁴⁴

iv. Precious Minerals

Precious minerals such as gold, diamond, platinum, wolframite, ruby and sapphire belong to the same detrital deposits as are described above.¹⁴⁵ Of these, gold and diamond have so far been extracted from the sea bed of the continental shelf and the rest are usually extracted from river beds onshore.¹⁴⁶ It is assumed, however, that since most rivers were covered by sea water during the rise of the level, those containing these minerals onshore are likely to have deposited them in the sea bed.¹⁴⁷

The problems concerning the exploitation of precious detrital deposits are purely economic. For example, it was confirmed by the Inlet Oil Corporation that platinum is present in the sands and muds of Goodnews Bay, Alaska, but it has not yet been economically feasible to separate

dredge was built recently by the Japanese. They scrape the ocean bottom, then suck up the material made up of sands and muds. Once aboard the ship, the ore is automatically separated from the bulk of the material, which is then returned to the ocean. The Japanese are also experimenting with a continuous-belt dredge which could, perhaps, work at depths of up to 4,000 meters". Ibid.

144. Skinner et al, Op. Cit., in note 2 (p. 3), at p. 54.

145. Ibid., at p. 50.

146. Ibid.

147. Mero, Op. Cit., in note 55 (p. 291), at p. 80. He notes that "The Salmon River in Alaska has been mined

the fine platinum from equally fine mud.¹⁴⁸ Gold and diamonds, on the other hand, have been extracted from the sea bed of the continental shelf, although the areas from which these minerals are extracted are limited. In Namibia the extraction of diamonds from the sea bed began in the early 1960s and this is by far the most important area for dredging diamonds. Skinner et al state that:

"Interesting and unique detrital deposits of diamonds occur in South West Africa, between Luderitz Bay and the Orange River. Ancient rivers in the area carried diamond-bearing gravels from primary sources in the interior of Southern Africa to the sea. Current and wave action then deposited the gravels along the coast as a series of beach terraces. Most of the beach terraces are now exposed, but some are submerged, thus making it necessary to employ floating dredges to recover the gravels from the ocean floor".¹⁴⁹

It has been confirmed that gold deposits are present in the coastal sands off Eureka, California, and within three miles of the Nome, Alaska coasts.¹⁵⁰

The extraction of precious minerals from the sea bed of the continental shelf is extremely limited. Dredging for diamonds in shallow waters off South West Africa is the only major exploitation in operation. Because of limited

for many years for platinum. The operations are now near the coast and the placers being mined are near or below sea level. From all appearances, this river valley extends seaward into Kuskokwim Bay and should contain platinum deposits at least equal in grade to those being mined on shore. The shallowness of the shelf in this area indicates that the drowned river valley of the Salmon may extend several hundred miles to sea". Ibid.

148. Bader and Ragotzkie, Loc. Cit., in note 101 (p. 311), at pp. 78-79.

149. Skinner et al, Op. Cit., in note 2 (p. 3), at p. 54;

deposits on the sea bed and the difficulty of exploiting them it is very unlikely these minerals will be exploited as extensively as those discussed earlier.

v. Biological Effects of Dredging Operations on the Marine Environment

Dredging is almost the only way in which placer deposits are being exploited. The dredging of channels to permit drilling operations for oil wells and the use of dredging for land reclamation create the same hazards to the marine environment.¹⁵¹ Dredging operations bring about the suspension of solid materials in sea water, cause turbidity and prevent light penetration, and, therefore, disturb and alter the natural balance of the ecosystem. The overall effects of dredging operations on the living resources of the coastal zone have been described by Portmann in the following terms:

"Dredging operations, though not directly toxic, may lead to increased turbidity and reduced primary production. In addition, important spawning, feeding or nursery grounds may be damaged or lost. The fine material stirred up may affect the migration routes of fishes, and valuable fisheries, eg. for salmon, may be lost or damaged. Furthermore, marine fish may be driven away.

Loftas, Op. Cit., in note 28 (p. 279), at p. 132;
Menard, Op. Cit., in note 132 (p. 319), at p. 538;
Mero, Op. Cit., in note 55 (p. 291), at pp. 79-80.

150. Bader and Ragotzkie, Loc. Cit., in note 101 (p. 311), at pp. 78-79.
151. Perkins, Op. Cit., in note 13 (p. 9), at p. 451;
Loftas, Op. Cit., in note 28 (p. 279), at p. 135.

Dredging operations can leave the sea bed unsuitable for fishing by light trawls or seines of 'catchy' ground".¹⁵²

Details of the biological effects of suspended materials caused by dredging operations have been given by Perkins and they are:

- "1. Mechanical or abrasive action (eg. clogging of gills and irritation of tissue)
2. Blanketing action or sedimentation
3. Reduction of light penetration
4. Availability as a surface for growth of bacteria and fungi
5. Adsorption/or absorption of various chemicals
6. Reduction of temperature fluctuation".¹⁵³

Dredging operations are carried out in various parts of the sea bed and although from legal point of view these areas fall within different regimes (territorial waters, continental shelf, economic zone) these operations have adverse effects on marine organisms throughout the coastal zone and its adjacent waters. Referring to the dredging of sand and gravel in the North Sea Sibthorp states that:

"The exploitation of sand and gravel from the North Sea, which has taken place since the early 1960s, poses dangers to fishery interests and the ecological balance by causing damage to the sea bed and by increasing turbidity of the surface waters, thus reducing light penetration. The chief complaints from the fishery industry have been hazards to trawl nets, disturbance of spawning grounds, burial of shellfish beds, and direct disturbance to fish from dredging.

152. J.E. Portmann, "Possible Dangers of Marine Pollution as a Result of Mining Operations for Metal Ore", in *Marine Pollution and Sea Life*, Op. Cit., in note 35 (p. 282), pp. 343-347, at p. 343.

153. Perkins, Op. Cit., in note 13 (p. 9), at p. 514.

It can also cause changes in navigable channels which in the shallow North Sea may be situated far out to sea; and may affect recreational and amenity interests by causing coastal erosion".¹⁵⁴

Dredging operations have already destroyed over half a million acres of the finest marshlands of the United States.¹⁵⁵ These areas cannot be retrieved and the resulting damage to migratory species and nursery grounds according to Perkins "must be considered irreversible".¹⁵⁶ Furthermore, any damage to the marshlands of estuarine areas by coastal States affects the biological productivity of the adjacent waters.¹⁵⁷ Referring to the destruction of marshlands Perkins notes that man has ignored the fact that marshlands "have an important influence upon the regulation of surface water in river basins and upon subsoil water levels, that they are areas of high biological productivity, and that they are important nursery grounds for commercially

-
154. Sibthorp, *Op. Cit.*, in note 53 (p. 290), at pp. 73-74. An example of erosion caused by dredging operation is given by Sibthorp as follows: "The classic case of accelerated erosion in the United Kingdom following dredging is that of the village of Hallsands in Devon. The dredging of some 650,000 tons of shingle offshore for harbour works at nearby Plymouth led to a lowering of its beach. Dredging was halted but within 20 years of the onset of dredging operation there, the village had been destroyed by wave action". *Ibid.*, at p. 74; see also Perkins, *Op. Cit.*, in note 13 (p. 9), at p. 606.
155. Ketchum and Tripp, *Loc. Cit.*, in note 108 (p. 313), at p. 13; Perkins, *Op. Cit.*, in note 13 (p. 9) at p. 451.
156. *Ibid.*; see also W.L. Trent, E.J. Pullen and D. Moore, "Waterfront Housing Developments: Their Effects on the Ecology of a Texas Estuarine Area", in Marine Pollution and Sea Life, *Op. Cit.*, in note 35 (p. 282), pp. 411-417, at pp. 411-412.
157. Perkins, *Op. Cit.*, in note 13 (p. 9), at pp. 450-451;



THE UNIVERSITY *of* EDINBURGH

PAGE MISSING IN ORIGINAL

be avoided. The fundamental question therefore arises whether there is any provision in either the 1958 Geneva Conventions on the Law of the Sea or the Text submitted by the UNCLOS III which refers to this problem.¹⁵⁹

159. For the legal basis of the exploitation of non-living resources of the sea bed and subsoil of the continental shelf see below C (iv).

C- Non-living Resources of the Subsoil of the Continental Shelf

Introduction

The ocean floor is generally divided into three major regions: the continental margin, the ocean basin and the major oceanic ridge systems.¹⁶⁰ Each region has different structural characteristics and consists of different resources.¹⁶¹ The continental margin which consists of the shelf, slope and rise has been studied by many oceanographers and marine experts; although these studies are far from complete they present enough evidence to evaluate the mineral contents of the subsoil of the continental shelf as well as the present exploitation of its resources and its future prospects.

Once part of the continent, the continental shelf became submerged during the ice ages and in the past 18,000 years the sea-level has risen about 100 metres.¹⁶² Thus the topography of the continental shelf as well as its rocks is similar to those of the adjacent land, a point which has been made by Skinner et al in the following terms:

"The continental shelf commonly is a submerged extension of the adjacent continent with similar topography and underlying rocks. Thus the eastern North American continental shelf most resembles the submerged equivalent

-
160. Keith S. Stowe, Ocean Science, 1979, at pp. 77-96; P.S. Meadows and J.I. Campbell, Marine Science, 1978, at pp. 2-6; Skinner et al, Op. Cit., in note 2 (p.3), at pp. 6-14; K.K. Turekian, Oceans, 1976, at pp.14-19; J. Weisberg and H. Parish, Introductory Oceanography, 1974, at pp. 61-68.
161. Stowe, Op. Cit., in note 160 (p. 330), at p. 77.
162. Ibid., at p. 80; Skinner et al, Op. Cit., in note 2 (p. 3), at p. 9. Stowe, Op. Cit., in note 160, at p. 80.

of the coastal plain, whereas in the western United States the hill and trough topography of that region continues under the ocean surface".¹⁶³

It is, therefore, to be expected that the continental shelf will contain almost all the minerals and other resources which have been found on the adjacent continental mass.¹⁶⁴ So far, the resources exploited from the subsoil of the continental shelf have been limited although as regards the cash value they are the most important resources. They include oil, gas, coal, sulphur, barite, iron ore, nickel-copper ores, tin and limestone.¹⁶⁵

In this section the resources of the subsoil of the continental shelf, the extent of their exploitation, the biological effects of their exploitation on marine organisms and the legal basis of their exploitation will be discussed. The non-living resources of the subsoil of the continental shelf are divided into non-metallic and metallic resources and will therefore be described separately.

This section is divided into the following headings:

- i. Non-metallic Resources
- ii. Metallic Resources
- iii. Biological Effects of the Exploitation of minerals from Subsoil
- iv. Legal Basis of the Exploitation of Minerals from Sea Bed and Subsoil.

163. Skinner et al, Op. Cit., in note 2 (p. 3), at p. 8.

164. Ibid., at pp. 39-40.

165. Wenk Jr, Loc. Cit., in note 99 (p. 311), at pp. 259-260. The exploitation of oil and gas has been excluded from the scope of this dissertation.

i. Non-metallic Resources of the Subsoil of the Continental Shelf

Excluding oil and gas, the most important non-metallic resources which have been exploited from subsoil of the continental shelf are: sulphur, barytes (barite), coal and fresh water.

1. Sulphur - Sulphur has been removed from the rock caps of salt domes. It was first discovered by the Humble Oil Company of the United States during a search for oil in the Gulf of Mexico.¹⁶⁶ The rock caps of salt domes contain resources such as common salt, potassium salts and sulphur and so far only sulphur has been exploited.¹⁶⁷ Charlier describes the exploitation of sulphur in the United States in the following terms:

"Contemporary sea-sulphur production exceeds 10 per cent of the total sulphur production in the United States, or about 60.000 tons in 1965. For the peak year of 1968, US production came 20 per cent from the ocean. Potential reserves in subsea salt domes appear to be in the millions of tons, based on information obtained from holes bored in the Gulf of Mexico and the Mediterranean Sea. Considering the United States alone offshore reserves of Frash sulphur exceed 200 million 'long' tons, of which 100 million tons are certainly recoverable. Production for the 15 year span 1960-1975 from outer continental shelf increased 12-fold".¹⁶⁸

166. Loftas, Op. Cit., in note 28 (p. 279), at p. 126.

167. Skinner et al, Op. Cit., in note 2 (p. 3), at p. 40.

168. Charlier, Loc. Cit., in note 19 (p. 276), at p. 202. According to Skinner et al: "Two large salt domes off Louisiana coast are now producing sulphur. One, the Grand Isle alone, has been producing for many years (since 1960) whereas a second, the Comminda Pass dome, started producing in 1968. Their combined

Offshore sulphur is mostly used as fertilizer (40 per cent) and in the chemical industries (20 per cent). According to Charlier:

"A new market may develop as sulphur concrete competes with cement in the construction business".¹⁶⁹

2. Barytes (Barite) - Barytes is an important mineral which is used in well drilling for oil and gas.¹⁷⁰ Its exploitation has, so far, been limited to the offshore coastal areas of Alaska in the Pacific Ocean.¹⁷¹ According to Bader and Ragotzkie, Castle Island Barite Mine:

"...is the only underwater lode mine on the Pacific coast, and its location, Off Castle Island, southeast Alaska, makes it economically important to the growing petroleum industry in Alaska. Barite, the chief mineral produced at this mine, is used in powder form as an additive to oil well drilling fluids. At the present time this mine satisfies about 20 per cent of the domestic US barite demand...".¹⁷²

Barytes has also been found off the Californian coast.¹⁷³ The total production of barytes from the subsoil has, according to Charlier, "an economic value of \$1 million yearly".¹⁷⁴ The offshore exploitation of barytes is expected

reserves are inferred to be close to 35 million tons. In total, nearly 200 million tons of sulphur have already been produced from salt domes in the coastal region of the Gulf of Mexico, and the ultimate production will certainly be much higher". Op. Cit., in note 2 (p. 3), at p. 45.

169. Ibid, at p. 113; Charlier, Loc. Cit., in note 19 (p. 276), at p. 203.

170. Ibid, at p. 203.

171. Loc. Cit., in note 101 (p. 311), at p. 78.

172. Ibid.

173. Charlier, Loc. Cit., in note 19 (p. 276), at p. 203.

174. Ibid.

to increase as it is needed for the exploitation of oil and gas.¹⁷⁵

3. Coal - The extraction of coal from the subsoil of the submarine areas was first conducted in Scotland about 1530.¹⁷⁶ Today, there are well over 100 subsoil coal mines in operation. They operate from land, islands and artificial islands and extract coal from depths of up to 2,400 metres below the sea bed and 120 metres below sea level.¹⁷⁷ Subsoil coal mining is in operation in Japan, China, Turkey, Chile, Great Britain and in the Canadian Province of Nova Scotia.¹⁷⁸

Japan started its subsoil coal mining in 1860 and today offshore mines provide 10.8 million tonnes or 38 per cent of the country's total production.¹⁷⁹ In Britain, subsoil coal accounts for 10 per cent of the country's total production.¹⁸⁰

Vast deposits of coal have been located in the subsoil of the continental shelves of the United States (off Alaska), Canada, Brazil, Argentina, Australia, Greece, Norway, the Arctic USSR, Spain and Israel.¹⁸¹ The world's total production of coal is about 3.0×10^9 tonnes a year

175. Wenk Jr, Loc. Cit., in note 99 (p. 311), at pp. 259-260.

176. Charlier, Loc. Cit., in note 19 (p. 276), at p. 209.

177. Ibid.

178. Ibid.

179. Ibid.

180. Ibid.

181. V.E. McKelvey & F.F.H. Wang, "World Subsea Mineral Resources", Report, US Geological Survey (Washington DC, Dept. of Interior, 1970) cited by Charlier, *ibid.*

and the annual growth rate is estimated at about 3.5 per cent.¹⁸² The future of the coal industry will prove to be vital as oil reserves are expected to be reduced within the next few decades. Menard states that:

"The availability of coal has been essential to the development of such great industrial nations as Britain, Germany and the United States. Coal diminished in importance as the consumption of oil and gas grew, but it remains the staple energy source for power plants that generate electricity, and it is still highly important in industry, particularly in the chemical and steel industries. Because it will last much longer than oil and gas, its distribution will become increasingly important in international affairs, unless new energy sources are developed".¹⁸³

4. Fresh Water - Fresh water is currently pumped from the springs of the subsoil of the continental shelf in the United States, Greece and Belgium.¹⁸⁴ Charlier has described the present exploitation and the future prospects of acquiring fresh water from the subsoil of the continental shelf as follows:

"...there are additional freshwater sources (aquifers and springs) underneath the continental shelf that could, when tapped, provide coastal settlements with a valuable resource. Although much of it remains unused, springs in Argolis Bay (Greece) emit '63,000 m³ of fresh water daily, with current value of \$36 million per year... Sites already located for such springs include several areas of the Mediterranean and possibly the Romanian coast of the Black Sea; in the Pacific, Japan, Australia, Guam, Samoa and Chile, and the California coast of the United States; in the

182. Gerald Foley and Charlotte Nassim, The Energy Question, 1976, at p. 122.

183. Menard, Op. Cit., in note 132 (p. 319), at p. 514.

184. Evan Luard, The Control of the Seabed, 1974, at p. 19; Skinner et al, Op. Cit., in note 2 (p. 3), at pp. 48-49;

Atlantic, South Carolina, Florida, several locations in the Gulf of Mexico, the Mexican Yucatan Peninsula, the Bahamas, Barbados and Cuba".¹⁸⁵

ii. Metallic Minerals from the Subsoil of the Continental Shelf

The exploitation of metallic minerals from the subsoil of the continental shelf is limited to a few, namely iron ore, tin, copper and zinc.¹⁸⁶ Although there is no doubt that most minerals are present within the rocks of the continental shelf the progress of exploitation has been extremely slow. The reasons are as follows. First, these minerals are still available in abundance on land and although they can be exploited from offshore with present technology the cost would be at least double. Secondly, to locate the minerals in quantities sufficient to make them economically exploitable is still an obstacle. The rocks containing these minerals are beneath sediments whose thickness varies from several metres to several hundred metres.¹⁸⁷

Charlier, Loc. Cit., in note 19 (p. 276), at p. 162.

185. Ibid. According to Skinner et al:

"For many coastal communities the availability of water from aquifers that dip out under the continental shelf is vitally important. The large New York population on Long Island, for example, relies heavily on water from layers of sand and gravel, called the Lloyd, Magothy and Jameco aquifers, that dip southward under the sea. The continental margin thus serves as a water reservoir for Long Island and many other coastal communities". Op. Cit., in note 2 (p. 3), at p. 49.

186. Wenk Jr, Op. Cit., in note 99 (p. 311), at p. 260; Luard, Op. Cit., in note 184 (p. 335), at p. 19; Skinner et al, Op. Cit., in note 2 (p. 3), at p. 39.

187. According to Skinner et al, "The critical question,

Notwithstanding these difficulties, iron ore is recovered from the subsoil of the continental shelf in Finland and Canada.¹⁸⁸ Tin and copper have been extracted from the subsoil of the submarine areas off the Cornish coast of England.¹⁸⁹ Copper and zinc are mined from the subsoil off Maine in the United States.¹⁹⁰ Wenk Jr notes that:

"To date, 100 sub sea mines with shaft entries on land have recovered coal, iron ore, nickel-copper ores, tin and limestone off a number of countries in all parts of the world".¹⁹¹

In 1968 a UN poll concerning the use of the ocean was distributed among the members and of 58 States responding to the questionnaire, 19 States were exploiting petroleum and gas while 18 States were exploiting minerals from sea water, sea bed and subsoil.¹⁹² According to Charlier:

"The current value of dredged and mined sub sea minerals exceeds \$ 600 million annually, but accounts for only 2 per cent of the world production".¹⁹³

therefore, is not whether deposits occur or how to work them, but how do we find suitably large and rich deposits to warrant exploitation? Metallic mineral deposits occupy exceedingly small volumes compared to the volume of the geological units within which they must be sought. Location techniques must, therefore, be very precise. Unfortunately, most of the world's continental margins are covered by at least a few metres of contemporary sediments, and usually as much as a thousand metres, whereas metallic mineral deposits are more commonly found in the rocks below". Op. Cit., in note 2 (p. 3), at p. 39.

188. Ibid.

189. Ibid.

190. Charlier, Loc. Cit., in note 19 (p. 276), at p. 203; Bader and Ragotzkie, Loc. Cit., in note 101 (p. 311), at pp. 76-80.

191. Wenk Jr, Op. Cit., in note 99 (p. 311), at p. 39.

192. UN Doc. E/4487, cited by Wenk Jr, *ibid*, at pp. 21-31.

193. Charlier, Loc. Cit., in note 19 (p. 276), at p. 196.

iii. Biological Effects of the Exploitation of Minerals from the Subsoil

As mentioned earlier, subsoil mining is progressing slowly and at present its extent is fairly limited. The biological effects of mining are almost identical to those of dredging operations.¹⁹⁴

Many metallic deposits are considered as potential resources and, therefore, it is likely that they will be exploited in the near future.¹⁹⁵ Among metallic minerals whose exploitation can be dangerous to both marine life and man, if their mining is not closely monitored, are antimony, arsenic, bismuth, cadmium, copper, selenium uranium and zinc.¹⁹⁶ Some of these and other elements are absolutely essential at low concentrations for marine fauna and flora. Perkins states that:

"For normal healthy growth, all plants have requirements for phosphate, nitrate, iron, cobalt, manganese, copper and zinc; some require silicon, molybdenum and vanium, also. All animals require iron, which may be essential for their respiratory pigments; other species require copper for this purpose".¹⁹⁷

These elements, as explained in Chapter V, are present in sea water; further introduction of these elements into the marine environment, from whatever source, will increase

194. See above pp. 325-329. According to Sibthorp: "Coastal coal mines, the shaft of which run under the sea, can have a destructive influence on the shore life and tailings can, as in Durham, totally destroy beaches by over-laying them with a skin of coal or black mud". Op. Cit., in note 53 (p. 279), at p. 74.

195. Skinner et al, Op. Cit., in note 2 (p. 3), at p. 40.

196. Portmann, Loc. Cit., in note 152 (p.326), at pp. 343-346.

197. Perkins, Op. Cit., in note 13 (p. 9), at p. 10.

their levels in a very delicate and balanced system. According to Wood and Kelley:

"...environmental levels may greatly exceed the concentrations to which organisms are normally exposed in areas where these elements are mined or processed, or where waste materials containing them are discharged... Of these substances, copper, zinc and molybdenum are required elements in low concentrations for biological growth but may become toxic in high concentrations. The other elements vary widely in toxicity, but lead, chromium, cadmium, mercury, selenium, and antimony are of greatest concern".¹⁹⁸

Zinc and copper which are currently mined from the subsoil of the submarine area, have different effects on marine organisms. Copper is toxic to seed plants, crustacea, molluscs and marine mammals.¹⁹⁹ Zinc, on the other hand, according to Portmann, "presents little risk to man, but may well adversely affect fish and shellfish, particularly in the young stages".²⁰⁰

The possible future subsoil mining of some minerals such as mercury, uranium, selenium, antimony, arsenic and

198. Donald W. Wood and Eleanor Kelley, "Contamination and Coastal Pollution", in The Water's Edge, Op. Cit., in note 53 (p. 215) pp. 146-186, at pp. 152-153.

199. Perkins, Op. Cit., in note 13 (p. 9), at p. 562; Portmann, Loc. Cit., in note 152 (p. 326), at p. 344. According to Perkins:
"All elements are toxic if the concentration is high enough, and some are notorious even at low concentration. Copper, an essential micronutrient of all organisms, is highly toxic at low concentrations; other micronutrients are toxic when supplied in excess, but not all are so striking as copper". Op. Cit., in note 13 (p. 9), at pp. 553-555.

200. Portmann, Loc. Cit., in note 152 (p. 326), at p. 345.

cadmium is causing great concern among marine scientists.

Referring to arsenic, for example, Portmann states:

"In areas of naturally high arsenic concentrations, shellfish can contain as much as 100 ppm, therefore any exploitation of arsenic minerals would have to be accompanied by local restrictions on the sale of shellfish and possibly fish".²⁰¹

201. Ibid., at p. 343. Discussing the possible mining for mercury he notes that:

"In recent years it has become apparent that mercury is readily bioaccumulated by fish and shellfish, particularly in the most toxic form, methyl mercury. In some areas, fish have been declared unfit for human consumption because of their mercury content. A number of deaths and serious illness have occurred as a result of people eating shellfish and fish which had high mercury levels. The source of mercury in these cases has not been mining, but they must serve as a warning of what might occur if marine sources of mercury-containing ores were exploited". Ibid, at p. 344.

In 1953 and 1964 Minimata disease broke out and some 130 people in Japan were poisoned by eating fish and shellfish containing mercury. According to Perkins: "This outbreak of mercury poisoning, or Minimata disease, arose from the contamination of algae and invertebrates, the food for fishes, themselves taken as food by man. The active agent was methyl mercury derived from acetaldehyde and vinyl chloride plant. Minimata disease is symptomised by a wide range of serious neurological disturbances, including blindness, deafness, stupor, coma, loss of emotional control and intellectual impairment. The community most affected were fisher-folk who live at Minimata Bay, Kyushu and the River Agano, Niigata Prefecture, Japan and who ate shellfish, crabs and fishes. Human mortality was 40 per cent and 17 per cent at the former and latter respectively: fish-eating birds and mammals were affected also". Op. Cit., in note 13 (p. 9), at p. 481; see also T. Nitta, "Marine Pollution in Japan", in Marine Pollution and Sea Life, Op. Cit., in note 35 (p. 282) pp 77-82, at p. 78; B.W. Halstead, "Toxicity of Marine Organisms Caused by Pollutants", Loc. Cit., pp 584-594, at pp. 587-588.

iv. Legal Basis of Exploitation of Sea Bed and Subsoil of the Continental Shelf

In seeking a legal solution to any problem caused by dredging and mining operations we face certain complications in that the international law applicable to this kind of exploitation is vague, inadequate and fragmentary. These deficiencies in the law relating to the exploitation of sea bed and subsoil should be recognised and necessary clarifications and alterations made.

The geological definition of the continental shelf as the extension of the land territory under the sea water, referred to in the United States Proclamation of 1945,²⁰² was firmly approved by the International Committee on the Nomenclature of Ocean Bottom Features in 1953 which defined the continental shelf as "the zone around the continent, extending from the low-water line to the depth at which there is a marked increase of slope to greater depth..."²⁰³

It is clear that the continental shelf in fact begins from the low-water line and ends at the point where there is a marked slope and that the area as a whole is considered as the continental shelf. Although this condition, i.e. the extension of the land territory under the sea water is one without which the submarine area cannot properly be regarded as the continental shelf, the

202. Paragraph Four of the Proclamation stated inter alia that:

"....since the continental shelf may be regarded as an extension of the land-mass of the coastal nation and thus naturally appurtenant to it....". See above pp. 72-86 and pp. 3-7.

203. UNCLOS I, Official Records, Vol. 1, at p. 39; ILC Yearbook (1956), at p. 131.

1958 Geneva Convention on the Continental Shelf did not include it within the definition it adopted.²⁰⁴ This question, however, was carefully examined by the ICJ in the North Sea Continental Shelf Cases.²⁰⁵ The Court, throughout its judgement, made it clear that coastal States could not, under international law, claim any rights as regards the continental shelf unless the submarine area was the 'natural prolongation' of the land territory.²⁰⁶

The view expressed by the ICJ has appeared as part of the legal definition of the continental shelf in the Texts submitted so far by the UNCLOS III.²⁰⁷ Notwithstanding the clarity of the definition of the shelf, the juridical character of the submarine area is divided in international law. The juridical character of the continental shelf can be discussed with reference to:

1. The provisions of the 1958 Geneva Convention on the Continental Shelf and
2. The provisions of the UNCLOS III.

It must be pointed out that since 1973, attempts have been made by the United Nations Environment Programme (UNEP) to provide guidelines regarding the conservation and harmonious exploitation of natural resources shared by two or more States with the view to minimising their effects on

204. See above pp. 175-190.

205. North Sea Continental Shelf Cases, Judgment, ICJ Reports (1969).

206. *Ibid*, at p. 22, para. 19 and *ibid*, at p. 31, para. 43. See below at pp. 472-481.

207. Article 62 of ISNT (A/CONF. 62/WP 8/Part II, 7 May 1975); Article 64 of RSNT (A/CONF. 62/WP 8/Rev. 1,

the human environment. The UNEP's efforts and contribution will be shown at the end of this section.

1. Juridical Character of the Continental Shelf under the Provisions of the 1958 Convention on the Continental Shelf

Article 1 of the above Convention refers to the continental shelf as "the seabed and subsoil of the submarine area adjacent to the coast, but outside the area of the territorial sea" within which the coastal States exercise, according to Article 2, "sovereign rights for the purpose of exploring it and exploiting its natural resources". The superjacent waters remain as high seas (Article 3) and in exercising their sovereign rights over the seabed and subsoil, the coastal States must not unjustifiably interfere with "navigation, fishing or the conservation of the living resources of the sea".²⁰⁸ There is no doubt that the provisions of Article 5 (1) mean 'direct unjustifiable interference' although in the light of coastal States' increasing interests in exploiting the seabed and subsoil of the continental shelf and possible dangers to marine life and the environment, it would seem necessary to extend those provisions to indirect unjustifiable interference with navigation, fishing and the conservation of the living resources of the high seas.

In addition, the Conference failed to decide on other important issues such as the seaward limit of the coastal States' sovereign rights and the limit of the territorial

Part I, 6 May, 1976; Article 76 of ICNT (A/CONF. 62/WP 10 and ADD.1, 1977 and Article 76 of ICNT (A/CONF. 62/WP 10/Rev.3, 27 August 1980.

208. Article 5(1) of the 1958 Convention on the Continental

sea. The failure to reach an agreement on a precise limit of the breadth of the territorial sea within which coastal States exercise their sovereignty may encourage the coastal States to extend their territorial sea. In doing so, they would secure their sovereignty, not only over the living resources of a wider territorial sea, but also over its seabed and subsoil. This proved to be the case, since by October 1977 some 65 coastal States claimed exclusive economic zones or fishery zones of 12 to 200 miles while no fewer than 27 coastal States claimed between 12 to 200 miles of territorial sea.²⁰⁹

The juridical character of the geographical continental shelf according to the provisions of the 1958 Geneva Conventions on the Law of the Sea is divided. Within the limit of the territorial sea, coastal States have sovereignty over the superjacent waters as well as its seabed and subsoil, while beyond that limit they have sovereign rights for the purposes of exploring the continental shelf and exploiting its natural resources.²¹⁰ For legal purposes, however, the shelf begins at the outer limit of the territorial sea. This juridical division is further complicated by the absence of an internationally accepted limit of the territorial sea on the one hand and the

Shelf.

209. Arvid Pardo, "The Evolving Law of the Sea: A Critique of the Informal Composite Negotiating Text (1977)", in *Ocean Yearbook* 1, Op. Cit., in note 19 (p. 276), at pp. 35-36 (Table A 1).

210. Sovereignty enjoyed by coastal States is subject to

exploitability criterion regarding the seaward limit of the continental shelf on the other. No reference is made in the 1958 Convention on the Territorial Sea to the extent of the coastal States' sovereignty within the territorial sea, the complete exercise of which may endanger the living resources of adjacent waters which are regarded as the high seas. It can be concluded that the provisions of the 1958 Geneva Conventions on the Law of the Sea do not impose any restriction on coastal States regarding the exploitation of the seabed and subsoil as long as it does not directly and unjustifiably interfere with navigation, fishing or the conservation of the living resources of the sea as required by Article 5(1) of the Convention on the Continental Shelf.

2. Juridical Character of the Continental Shelf under the Provisions of UNCLOS III ²¹¹

Article 3 of the Draft Convention on the Law of the Sea (ICNT. Rev. III) has proposed 12 nautical miles as the limit of the territorial sea within which coastal States have sovereignty over the air space as well as the sea bed and subsoil.²¹² No reference has been made to protecting the natural environment of the adjacent waters when the exploitation of the sea bed and subsoil is carried out within 12 nautical miles of the territorial sea.²¹³

the right of innocent passage set by Articles 14-17 of the 1958 Geneva Convention on the Territorial Sea and the Contiguous Zone.

211. A/CONF. 62/WP. 10/Rev. 3, 27 August 1980.

212. Ibid., Article 3.

213. Part XII of the Draft Convention deals with the

A further problem is that beyond the territorial sea the submarine area has two different juridical characters. First, the submarine area within the Exclusive Economic Zone (EEZ), and secondly, the continental shelf.

Article 56 of the ICNT (Rev. 3) describes the rights and duties of the coastal States within the EEZ and state:

"1. In the exclusive economic zone, the coastal State has:

(a) sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the sea-bed and subsoil and the superjacent waters, and with regard to other activities for the economic exploitation and exploration of the zone,.....".²¹⁴

Article 57 has set the breadth of the EEZ at 200 nautical miles from the baseline from which the breadth of the territorial sea is measured and Article 58 grants rights to States for the laying of submarine cables as well as navigation and overflight in the zone.

Article 76 of the same Draft Convention defines the continental shelf as:

"1. The continental shelf of a coastal State comprises the sea-bed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baselines from which the breadth of the territorial sea is measured where the outer edge of the continental margin does not extend to that limit".²¹⁵

The coastal State, according to Article 77 (1)

protection and preservation of marine environment. The provisions incorporated in this part impose a general obligation regarding the protection and preservation of the marine environment. See Articles 192-212.

214. Ibid., Part V.

215. Ibid., Part VI.

exercises sovereign rights for the purpose of exploring its continental shelf and exploiting its natural resources.²¹⁶ The superjacent waters, according to Article 78 are not affected, while Article 79 ensures that other States have the right to lay submarine cables and pipelines.²¹⁷

Perhaps the only difference between the two sets of regulations governing the sea bed and subsoil of the submarine areas is that if the continental shelf extends beyond 200 nautical miles the coastal State can extend its sovereign rights accordingly provided it makes payments and contributions through the Authority (Article 82).²¹⁸

The question arises here whether, if two States share the same submarine area which is within the EEZ of one State, but is the natural prolongation of the land territory of the other, the latter can prevent the former from exploiting it. The answer is in the affirmative, for Article 56 after describing the rights, jurisdiction and duties of the coastal States in the EEZ (paragraphs 1 and 2) states that:

"The rights set out in this article with respect to the sea-bed and subsoil shall be exercised in accordance with Part VI".

And Article 77 dealing with the rights of the coastal

216. Ibid.

217. Ibid.

218. Ibid. Paragraph 1 of Article 82 states that: "The coastal States shall make payments or contributions in kind in respect of the exploitation of the non-living resources of the continental shelf beyond 200 nautical miles.....". Article 76 (6) states that "... the outer limit of the continental shelf shall not exceed 350 nautical miles from the baselines from

States over the continental shelf states that:

"1. The coastal State exercises over the continental shelf sovereign rights for the purpose of exploring it and exploiting its natural resources.

2. The rights referred to in paragraph 1 are exclusive in the sense that if the coastal State does not explore the continental shelf or exploit its natural resources, no one may undertake these activities without the express consent of the coastal State.

3. The rights of the coastal State over the continental shelf do not depend on occupation effective or notional, or on any express proclamation".²¹⁹

The Text does not provide any answer to the question of exploitation of mineral resources from the sea bed and subsoil of the continental shelf beyond the 200 nautical mile limit which can be within the EEZ of another State. Although the latter cannot exercise its sovereign rights over the sea bed and subsoil, its sovereign rights over the superjacent waters are not affected. This can lead to conflict on which the Text is silent.

The exploitation of the sea bed and subsoil can, as discussed earlier, affect and alter the natural balance of the ecosystem. This aspect of the exploitation has not been given enough consideration in the Text. Dredging and mining operations, whether within the limit of the territorial sea or beyond it, are a serious danger to biological productivity and can extend beyond the national jurisdiction.

which the breadth of the territorial sea is measured. This paragraph does not apply to submarine elevations that are natural components of the continental margin, such as its plateaux, rises, caps, banks and spurs".

219. Ibid, Article 77 paragraphs 1,2, and 3.

3. The United Nations Environment Programme

a. Stockholm Declaration

The UNEP originated from the United Nations Conference on Human Environment held in Stockholm from 5 to 16 June, 1972.²²⁰ This Conference produced the Declaration on the Human Environment known as the Stockholm Declaration. The Declaration adopted 9 recommendations emphasising the importance of the protection of the human environment with specific references to marine pollution. Paragraph 3 stated inter alia that:

"We see around us growing evidence of man-made harm in many regions of the earth; dangerous levels of pollution in water, air, earth and living beings; major and undesirable disturbances to the ecological balance of the biosphere; destruction and depletion of irreplaceable resources".²²¹

Having acknowledged the importance of the preservation of the human environment the Declaration provided 26 Principles of which the following are the most important ones since they were, as will be shown, further developed by the UNEP:

"2. The natural resources of earth including the air, water, land, flora and fauna and especially representative samples of natural ecosystems must be safeguarded for the benefit of present and future generations through careful planning or management as appropriate.
.....

6. The discharge of toxic substances and the release of heat, in such quantities or concentrations as to exceed the capacity of the environment to render them harmless, must be halted in order to ensure that serious or irreversible damage is not inflicted upon ecosystems.....

220. See the Text in New Directions in the Law of the Sea, Op. Cit., in note 19 (p. 12), Vol. II, pp. 712-717.

221. Ibid., at p. 712.

7. States shall take all possible steps to prevent pollution of the seas by substances that are liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea.....

21. States have, in accordance with the Charter of the United Nations and principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within jurisdiction or control do not cause damage to the environment of other States or of seas beyond the limits of national jurisdiction.

22. States shall cooperate to develop further the international law regarding liability and compensation for the victims of pollution and other environmental damage caused by activities within the jurisdiction or control of other States or of areas beyond their jurisdiction".²²²

b. UNEP's Draft Principles on Shared Natural Resources

In 1975, pursuant to General Assembly Resolution 3129 (XXVIII) of December, 1973, an Intergovernmental Working Group of Experts was set up by the Governing Council to "prepare draft principles of conduct for the guidance of States in the conservation and harmonious exploitation of natural resources shared by two or more States".²²³

At its Fifth session held in Nairobi from 9 to 25 May,

222. Ibid., at pp. 714-717. For further discussion see Carl August Fleischer, "Pollution from Seaborne Sources", in New Directions in the Law of the Sea, Vol. III, Collected Papers, edited by Churchill, Simmonds and Welsh, 1973, pp. 78-101; Peter Fotheringham and P.W. Birnie, "Regulation of North Sea Marine Pollution", in The Effective Management of Resources, edited by C.M. Mason, 1979, pp. 168-223.

223. UNEP/GC.6/17, 10 March 1978, Draft Principles of Conduct in the Field of the Environment for the Conduct of States in the Conservation and Harmonious Utilization of Natural Resources Shared by Two or More States.

1978 the Governing Council provided a draft of 15 Principles. The Draft Principles can be regarded as the most important document to have been produced by the UNEP regarding the exploitation of shared natural resources.

Principle 1 of the Draft states:

"It is necessary for States to co-operate in the field of the environment concerning the conservation and harmonious utilization of natural resources shared by two or more States. Accordingly, it is necessary that consistent with the concept of equitable utilization of shared natural resources, States co-operate with a view to controlling, preventing, reducing or eliminating adverse environmental effects which may result from the utilization of such resources. Such cooperation is to take place on an equal footing and taking into account the sovereignty, rights and interests of the States concerned".²²⁴

Principle 2, while referring to the importance of international cooperation concerning the conservation and harmonious utilization of the shared natural resources states that:

"States sharing such natural resources should endeavour to conclude bilateral or multilateral agreements between or among themselves in order to secure specific regulation of their conduct in this respect, applying as necessary, the present principles in a legally binding manner, or should endeavour to enter into arrangements, as appropriate, for this purpose".²²⁵

Principle 3 is exactly the same as Principle 21 of the Stockholm Declaration. According to Principle 4:

"States should make environmental assessments before engaging in any activity with respect to a shared resource which may create a risk of significantly affecting the environment of another State or States sharing that resource".²²⁶

224. Ibid., at p. 11.

225. Ibid.

226. Ibid., at p. 12.

Finally, according to Principle 12:

"States are responsible for the fulfilment of their international obligations in the field of the environment concerning the conservation and utilization of shared natural resources. They are subject to liability in accordance with applicable international law for environmental damage resulting from violations of these obligations caused to areas beyond their jurisdiction",²²⁷

There are two important defects in the Draft Principles. First, there is no definition regarding what constitutes shared natural resources,²²⁸ and secondly, they are concerned with the exploitation only of shared natural resources and not with the exploitation of natural resources which may endanger a shared resource. For example, placer deposits within the limit of the continental shelf are not shared resources although their exploitation endangers some living resources which may be caught by another State or States beyond the national jurisdiction and which certainly are 'shared natural resources'. Thus the scope of the Draft Principles is limited to the direct exploitation of a shared natural resource.²²⁹

The legal status of the Draft Principles is that they are no more than recommendations. That is, they do not impose any binding force or create any legal obligation. On the other hand, the Draft Principles which were approved by 30 experts from different countries together with experts from some international organisations, can be optimistically viewed as a step forward towards a better and wider co-operation

227. Ibid., at pp. 13-14.

228. Ibid., at p. 3 para. 9.

229. Paragraph 2 of Principle 3 states:

needed in matters of such vital importance.

4. Provisions of the Draft Convention on the Law of the Sea Regarding the Marine Environment

Part XII of the 1980 Draft Convention on the Law of the Sea deals with the protection and preservation of the marine environment.²³⁰

Article 192 states that: "States have the obligation to protect and preserve the marine environment".²³¹

Article 193 states that:

"States have the sovereign right to exploit their natural resources pursuant to their environmental policies and in accordance with their duty to protect and preserve the marine environment".²³²

Article 194 states inter alia that:

"1. States shall take all necessary measures consistent with this Convention to prevent, reduce and control pollution of the marine environment from any source using for this purpose the best practicable means at their disposal and in accordance with their capabilities, individually or jointly as appropriate, and they shall endeavour to harmonize their policies in this connexion.

2. States shall take all necessary measures to ensure that activities under their jurisdiction or control are so conducted that they do not cause damage by pollution to other States and their environment, and that pollution arising from incidents or activities under their jurisdiction or control does not spread beyond the areas where they exercise sovereign rights in accordance with this Convention".²³³

"The Principles set forth in Paragraph 1, as well as the other Principles contained in this document, apply only to shared natural resources". Ibid, at p. 11. For further details of the UNEP see Peter Thacher and Nikki Meith-Avin, "The Oceans: Health and Prognosis", in Ocean Yearbook 1, Op. Cit., in note 19 (p. 276), pp. 317-339.

230. A/CONF. 62/WP. 10/Rev. 3, 27 August 1980, pp. 81-98.

231. Ibid, at p. 81.

232. Ibid.

233. Ibid.

Article 196 (1) states that:

"States shall take all necessary measures to prevent, reduce and control pollution of the marine environment resulting from the use of technologies under their jurisdiction or control, or the intentional or accidental introduction of species, alien or new, to a particular part of the marine environment, which may cause significant and harmful damage thereto".²³⁴

Article 208 entitled "Pollution from sea-bed activities" states inter alia that:

"1. Coastal States shall adopt laws and regulations to prevent, reduce and control pollution of the marine environment arising from or in connexion with sea-bed activities subject to their jurisdiction and from artificial islands, installations and structures under their jurisdiction.....

2. States shall take other measures as may be necessary to prevent, reduce and control such pollution.

3. Such laws, regulations and measures shall be no less effective than international rules, standards and recommended practices and procedures ".²³⁵

The inclusion of the above and many other provisions regarding the protection and preservation of the marine environment in Part XII of the 1980 Draft Convention on the Law of the Sea is highly encouraging although these provisions seem to present 'recommendations' rather than 'obligations'. This is evident from Article 235 entitled "Responsibility and liability" which states that:

"1. States are responsible for the fulfilment of their international obligations concerning the protection and preservation of the marine environment. They shall be liable in accordance

234. Ibid, at p. 82.

235. Ibid, at p. 85.

with international law.

2. States shall ensure that recourse is available in accordance with their legal systems for prompt and adequate compensation or other relief in respect of damage caused by pollution of the marine environment by natural or juridical persons under their jurisdiction.

3. With the objective of assuring prompt and adequate compensation in respect of all damage caused by pollution of the marine environment, States shall co-operate in the implementation of existing international law and the further development of international law relating to responsibility and liability for the assessment of and compensation for damage and the settlement of related disputes, as well as, where appropriate, development of criteria and procedures for payment of adequate compensation such as compulsory insurance or compensation funds".²³⁶

The most important problem regarding the damage inflicted on other States, as a result of the activities carried out within the limits of national jurisdiction, by a coastal State is the assessment of the extent of the damage. No doubt that direct and serious damage will be compensated, since international law does provide evidence supporting such a view.²³⁷ On the other hand, the effect of the damage is not always immediate. As has been described in this Chapter, many effects of the coastal States activities disturb the biological balance and the productivity of the ecosystem. The damage is not instant and the cause is not easily attributable to one State or to certain activities. In this respect both the 1980 Draft Convention and international law are silent.

236. Ibid, at p. 97.

237. See for example The Trail Smelter Case (US. v. Canada) (1938 and 1941) 3 RIAA, p. 1905.